

GW3D
GREATER WHITSUNDAY ALLIANCE
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## Greater Whitsunday Region

# REGIONAL INNOVATION BENCHMARK RESEARCH REPORT

2020-2021

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**PREPARED BY**
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C Renando and Prof M Verreynne

**FOR**
Greater Whitsunday Alliance

2020-2021

# About GW3

Greater Whitsunday Alliance (GW3) is the peak independent economic development organisation for the Greater Whitsunday (Mackay Isaac Whitsunday) region, creating opportunities for the region to realise its full potential. GW3 delivers a range of economic development focused projects to help support and promote prosperity across the region.

**More information visit www.gw3.com.au.**

GW3
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# Foreword

**The Greater Whitsunday region has a rich history of embracing change and out-of-the-box thinking. Our region is at the forefront of embracing new ways of doing business and adopting new technologies to make our workplaces safer, more productive, and globally competitive.**

Through a strong 'can do' attitude and rethinking how we do business; our region is starting to pivot towards becoming more strategically focused and our communities more connected.

The economy of the Greater Whitsunday region offers diverse investment opportunities with a proven track record for growth and prosperity. The Isaac region is home to the Bowen Basin, housing the largest coal mining deposits in Australia. Most of Queensland's prime coking coal reserves are mined here, including the highest-grade metallurgical coal in the world.

Mackay is the centre of one of Australia's most developed Mining, Equipment, Technology and Service (METS) industries and has enormous biofutures potential. The Whitsundays is not only a world-class tourism destination, attracting more than a million visitors annually (as at 2019), but is a highly developed food producing region with sugar cane, horticulture and aquaculture.

Moving towards the future, Greater Whitsunday Alliance (GW3) will lead the way through innovative approaches to transform and diversify the Mackay Isaac Whitsunday economy.

GW3 will continue to showcase our region's evolving industries and their innovative champions to foster strong stakeholder engagement across a variety of industry including agriculture, aquaculture, biofutures, mining and METS, aerospace and aviation; along with tourism and transforming education skills and training.

The Greater Whitsunday Region Regional Innovation Benchmark Research Report 2020-2021 showcases how entrepreneurial mindsets support businesses to innovate even in times of uncertainty, and determine how business and industry can thrive in a dynamic environment on the cusp of change.

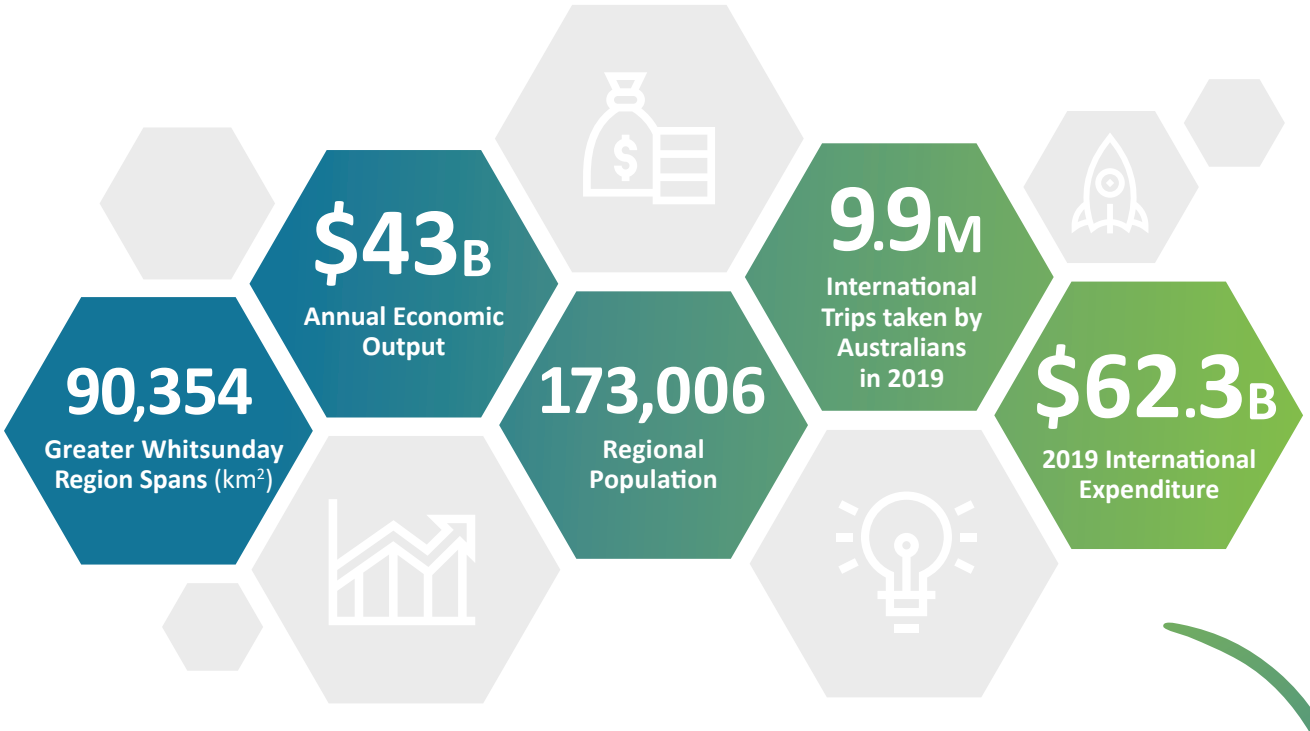
I would like to thank all the businesses who responded to the MIW business innovation survey, participated in the case studies and the support of the organisations who shared their views regarding our MIW regional innovation ecosystem.

Part of this research and data collection found in this report will help GW3 and our stakeholders to engage better with businesses to continue to build on our transforming foundations but also pave the way for our region to be inspired by technology and jobs of tomorrow.

**Kylie Porter**
**CEO, Greater Whitsunday Alliance**

# Executive Summary

**Entrepreneurship and regional innovation are vital for job creation, economic development and social prosperity within regional and rural areas.**




The Greater Whitsunday region, which includes Mackay, Isaac and Whitsundays, spans an area of 90,354km2, and has an annual economic output of almost $43 billion. It has a permanent regional population of close to 173,006 reflecting a low population density, comparable to regional entrepreneurial communities in Australia and globally.

The economy of the Greater Whitsunday region is as diverse, with strengths in Mining, Equipment, Technology and Service (METS) industries, bio-futures, tourism and a well-developed agribusiness industry. Entrepreneurial activity is supported by a developing innovation ecosystem that underpins its future success. Entrepreneurial activity is supported by an innovation ecosystem that underpins its future success.

The COVID-19 pandemic will have widespread and long-lasting impacts on the domestic and global tourism industry. In the Greater Whitsunday region, the impacts of COVID-19 on the tourism industry has been significant and is expected to continue over the medium term. Despite these impacts, there is significant opportunity within the domestic market. In the year ended March 2019, Australians took 9.9 million trips and spent $62.3 billion on international travel. There is optimism that Australians will choose to spend this amount domestically until international travel resumes.

The Greater Whitsunday Alliance (GW3) and partners are collaboratively driving a regional transformation strategy, in which innovation and economic diversification play a vital role.

4 Remplan, 2021. GW3 Economy, Jobs and Business insights and GW3, 2019. Regional Economic Profile.
5 KPMG 2020. Greater Whitsunday Alliance: Future Employment Study.

# Purpose of Report

**This report summarises the findings from the 2020-2021 MIW Regional Innovation Survey conducted by University of the Sunshine Coast on behalf of Greater Whitsunday Alliance.**

1. It measures businesses' innovation activity across the MIW region. The innovativeness of MIW firms is compared against 2019 and 2014 innovation data for Queensland and Australian firms.

2. Five illustrative case studies reflect how an entrepreneurial mindset supports businesses to innovate, even during times of uncertainty.

3. Innovation ecosystem resilience is assessed on economic, social and institutional dimensions to determine how community resources are used and leveraged to enable the business community and supporting organisations to thrive in dynamic environments characterised by uncertainty and unpredictability.

# Method

## The MIW Regional Innovation Benchmark (MIW RIB) 2020-2021 assesses regional innovation by:

1. measuring the innovation approaches local firms take and the value this generates. Innovation refers to the introduction of any new or significantly improved product or service, the introduction of new operational processes (producing and delivering) or the implementation of new organisational or managerial processes.

Firms were considered 'innovators' if they applied innovation across several innovation types and showed a high degree of relative newness related to the innovations implemented in the last three years.

This study utilises regionally relevant innovation measures based on the rigorous, internationally recognised innovation measurement framework developed by the Centre of Business Research (CBR), Cambridge University. A valid sample was collected from 97 firms in the MIW region in 2021 regarding their innovation activities for the year ending December 2020. To benchmark these MIW firms, this dataset was combined with 2019 and 2014 data from Queensland and Australia, resulting in a new data set of 1,754 firms.

2. five case studies of MIW firms reflecting the entrepreneurial mindset of local businesses in the region in the Mining, Equipment, Technology and Service (METS) industries, tourism and the agribusiness industry. These cases reflect the importance of continuous innovation in responding to adversity, such as the COVID-19 pandemic and offer lessons learnt for other businesses.

3. assessing the community resilience of the regional innovation ecosystem based on economic, social and institutional dimensions to gain a holistic view of the contribution of the ecosystem to the region. This assessment relied on an expert survey. Experts in this context are professionals who fulfil one of 12 critical roles within the innovation ecosystem and have first-hand experience of the region. They independently evaluated their own role and the role of others in the region. Across six regions of Queensland, the views of 85 experts were collected, of which nine were from the MIW region.

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6 OECD, 2018. Defining innovation.

# Key findings from the business innovation benchmark

**26.7%**

**of MIW innovators embraced fourth industrial revolution (4IR) technologies for cyber-physical systems, using automated business intelligence systems, data integration and smart technologies.**

**70%**

**of MIW innovators collaborate, experiencing benefits such as outsourcing, providing specialist products or services and developing staff and management capabilities.**

- The majority (80%) of MIW innovators had businesses between 3 to 10 years old, compared to 9.1% of Queensland innovator businesses between 3 to 10 years old.
- MIW innovators are likely to have a social media strategy, mobile enabled website, an innovation strategy and adopt contemporary practices such as monthly financial accounts (e.g. profit-and-loss, cash flow statement) a formal business plan.
- In the MIW region, both innovators and non-innovators engage in Research and Development (R&D) activities, in contrast to Queensland and Australian firms, where innovators are more like to engage in R&D.
- The most important personal goals for MIW innovators are stakeholder wellbeing, personal growth, the freedom to set and pursue objectives and pursuing family and personal wealth.
- 8.5% of businesses in the Mackay-Isaac-Whitsunday region indicated they implemented incremental (new-to-the-firm) innovations.
- The top knowledge-based innovation sources for MIW innovators are professional conferences, trade associations, chambers of commerce, and research institutes.
- MIW businesses show high levels of awareness of the support available, with innovators most likely to use support in the form of business skills, workshops, forums and seminars, grants and mentoring.
- MIW businesses were most likely to seek support from accountants; specialist agencies, e.g. social media marketing; legal advisors, and mentors.
- MIW innovators report higher business performance through increases in sales from new products and introduced services, improved profits per employee, profit and employee growth and improvements in labour productivity.

# Case Study Highlights

## The case studies reveal that innovators focus on:

- The strategic goal of building a business model rather than a product and developing an intellectual property protection strategy.
- Implement process innovations that bring about significant productivity improvements.
- Identify innovation opportunities through a focus on solving relevant industry problems, keeping abreast of industry trends such as sustainability trends which provide circular economy opportunities.
- Have a high level of awareness of the innovation process incorporating continuous learning, iteration and improvement and involving employees in the process.
- In tough times, meticulous attention to cost and cash management is needed, and keeping close to customers provide a valuable source of innovation opportunities
- Reach out for support from local business support organisations and make the most of local networking opportunities.

# Ecosystem resilience assessment

## The ecosystem resilience assessment reveals that:

- Entrepreneurship support, advocacy for entrepreneurship and the COVID-19 response in the MIW region is centralised among several key roles of the economic development organisation, government, and peak body roles.
- Trust and internal connection and collaboration were distributed among various roles in the MIW region.
- Joint leadership and coordination are needed within regional communities to fulfil critical innovation ecosystem functions in three ways. First to leverage regional strengths by allocating roles that require specialised knowledge and skills, second to facilitate coordination between roles, and finally to ensure measurement and monitoring of ecosystem health and priorities. External connections and collaboration can bring, should be ensured.
- Low ratings of the investor role reflect the potential need to develop this role and increase the awareness of this role to investable entrepreneurial opportunities.
- A sustainable model is needed to support the incubator role to better support early stage, innovation driven entrepreneurs' access to knowledge, networks and seed funds.
- Ratings reflect a low perceived awareness and integration of school-based entrepreneurial programs.
- Low perceived ratings of established firm involvement in the innovation ecosystem provide opportunities for engagement, connection and collaboration.
- Professional services provide significant entrepreneurship support for MIW businesses and are perceived trustworthy, thus should be involved in building local innovation capacity.

*Contents*

# Definitions

| | |
|---|---|
| ***Firm*** | Firms refer to a single business as a legal entity, which can be a sole proprietor, partnership or company. Innovation in this report is measured at firm-level. |
| ***Collaboration*** | Firms that collaborated had engaged in formal or informal collaborative or partnership arrangements with other organisations in the preceding three years. |
| ***Competitive advantage*** | The strategic advantage one business entity has over its rival entities within its competitive industry. Achieving competitive advantage strengthens and positions a business better within the business environment. |
| ***Engagement*** | When 'engagement' is used in this report, it is a binary variable (yes/no) that is calculated from other variables to indicate whether a firm reported any activities of a particular type. This can refer to engagement in research and development (R&D) or collaboration. |
| ***Full Time Equivalent (FTE)*** | Full Time Equivalent is a unit that indicates the workload of an employed person. For FTE, all full-time employees as well as 0.5 of all part-time staff is considered. |
| ***Firm size categories*** | Micro firms: 1-4 FTEs; Small firms: 5-19 FTEs; Medium-sized firms: 20-199 FTEs; Large firms: more than 200 FTEs. |
| ***Industries*** | Based on 2006 Australian and New Zealand Industry Classifications (ANZIC) |
| ***Innovation*** | The ABS defines innovation as '*the introduction of any new or significantly improved goods or services, the introduction of new operational processes (the methods of producing or delivering goods or services) or the implementation of new marketing, organisational and managerial processes.'* Firms were considered 'innovators' if they had introduced at least one of these types of innovation during the period reported.<br><br>All innovation questions refer to innovation conducted over a **three-calendar year period**. Firms were asked to consider innovation as occurring when any of the innovation types were introduced to the market. These improvements involved more than aesthetic changes or mere product differentiation. |

| | |
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| ***Innovation breadth*** | Refers to the implementation of different types of innovation across a range of business functions measured by a number of variables across four categories: products and services, operational processes, organisational or managerial processes, and marketing methods. |
| ***Non-innovators*** | Firms who did not report innovation in any of the product, service or process innovation types. |
| ***New-to-the-firm innovators*** | New-to-the-firm innovators reported at least one type of product, service or process innovation that was only new to the firm, and not new to the industry. This type of innovation is also known as an incremental innovation. |
| ***New-to-industry innovators*** | New-to-industry innovators reported at least one type of product, service or process innovation that was new to the industry. This type of innovation is also called a radical innovation known to change existing market structures, provides significant customer benefits and often involve a change in the behaviour or users. |
| ***Profitability*** | The degree to which a firm achieves financial gain. |
| ***Research and Development (R&D)*** | The systematic investigation or experimentation involving innovation or technical risk, the outcome of which is new knowledge or improved products, processes, materials, devices or services. R&D activity extends to modifications to existing products/processes. |
| ***Significant difference*** | A result is deemed statistically significant if it is unlikely to have occurred by chance. As used in statistics, 'significant' does not mean important or meaningful. |
| ***Sources of innovation*** | The origin of ideas or information for a firm's innovation activities. |
| ***Business support and government assistance*** | Self-help diagnostic and benchmarking tools, business skills, capacity development: workshops; forums; seminars; specialist business mentoring or coaching; business opportunity development, e.g. export services; connecting businesses, e.g. networking, R&D; and investment Grants/financial incentives. |

| | |
|---|---|
| ***Weighted data*** | Data collected from survey respondents are adjusted to represent the population from which the sample was drawn, measured in terms of location, size and industry. In this study it means regional data was weighted to limit response bias, so that responses from firms of different sizes and industries were weighted in proportion to their presence in the general population of Australian firms |
| ***Innovation ecosystem*** | The innovation ecosystem refers to a self-regulating system where the roles, actors, relationships, and networks that result in innovation development, delivery and outcomes. |
| ***Community resilience*** | The existence, development, and engagement of community resources by members to thrive in a dynamic environment characterised by uncertainty and unpredictability. |
| ***Boundary spanning*** | Boundary spanning describe individuals and organisations within an innovation ecosystem who bring new ideas to that system by linking internal regional organisations and networks to external information. |
| ***Backbone structure*** | A backbone structure coordinates multiple roles within a community. In an innovation ecosystem a backbone structure can bring together diverse forms of support for entrepreneurs. |

# 1. Introduction

Businesses across Australia and globally are recovering after a pandemic-induced recession in 2020[1], with Australia's borders closed for international travel. The Federal and State government restrictions imposed to protect the population's health, requiring many firms to embrace digital work practices, remote working, contactless delivery and adopt smart technologies. The pandemic necessitated a new way of working and service delivery for many organisations. Prior to the pandemic from 2017 to 2019, Queensland prioritised regional innovation and growing the digital economy, with more than AU$2 billion invested to enhance the state's innovation performance. While economic recovery is a priority in 2021, innovative, resilient and collaborative communities are well poised to rebound and overcome challenges.

This research project supports the Advancing Queensland Regional Innovation Program (ARIP) for the Mackay Isaac Whitsunday (MIW) region. The research has been commissioned by Greater Whitsunday Alliance (GW3) and is supported by Advance Queensland.

This study assesses regional innovation in three ways.

- First it focuses on business innovation approaches and performance, benchmarking MIW firms against other regional innovation benchmarks;
- Second five case studies of MIW firms reflect how an entrepreneurial mindset influences continuous innovation approaches during times of adversity.
- Third it assesses innovation ecosystem resilience on economic, social and institutional dimensions, to determine how resources are used and leveraged to enable regional communities to thrive in dynamic environments characterised by uncertainty and unpredictability.

This report provides evidence-based findings and identifies implications to improve regional resilience and business innovation that drives regional prosperity and a diversified economy. The MIW region takes a collaborative approach to economic development aimed at inclusive development and economic diversification.

GW3 is the peak independent economic development organisation for the Greater Whitsunday region, creating opportunities for the region to realise its full potential. GW3 delivers a range of economic development focused projects to help support and promote prosperity across the region. A regional transformation strategy drives economic development in the region, prioritising initiatives that encourage innovation and business development that builds on the regions strengths in key industries.

[1] Several sources reported on this recession such as MarketWatch and ABC news.

# 2. Purpose of Greater Whitsunday Region Regional Innovation Benchmark Research Report

This report presents the results of the MIW Regional Innovation Benchmark (RIB) three years after the ARIP program commenced. Benchmarking is aimed at the continuous improvement of performance, by identifying, understanding and adapting best practices of other businesses and regions.

## 2.1. Regional context: Mackay Isaac Whitsunday region

The capacity of regions to support innovation and entrepreneurial activities can be contextualised through demographic and socio-economic indicators, as well as innovation ecosystem characteristics of shared leadership, industry specialisation, proximity, open boundaries and support enablers[2].

The MIW region is a vast region of 90,354km$^2$ consisting of several small towns, with a total population of 173,006 and 85,165 jobs locally[3].

Economic activity is dominated by the mining sector which provides 19.48 per cent of employment per industry in the region. Significant industries by employment, other than mining, are the retail (8.94%), health care and social assistance (8.90%) and accommodation and food services (8.28%) industries. Small, independent firms dominate the agriculture, forestry and fishing sector (5.49%).

The economic profile and business size profile is atypical of the rest of Australia, with 15,552 businesses registered[9] in this vast region. This is a lower density of businesses relative to regional areas in South East Queensland.

Support with regional innovation ecosystems are influenced by characteristics such as place leadership, the degree of industry specialisation, proximity, the relative openness of the system and the resources available to those within that ecosystem[8]. For the MIW region the authors observe regional characteristics based on these elements:

- Shared leadership: A coordinated approach to economic development and entrepreneurship support is needed to set joint priorities and facilitate resource allocation. In the MIW region GW3 takes a partnership approach to regional development to address the region's challenges.
- Industry specialisation supports value chain development of firms providing complimentary services. In the MIW region the agribusiness and food production industry, biotechnology, mining, education and tourism industries are prioritised, but the low number of businesses in the region suggest that entrepreneurs might find it challenging to access industry specific expertise and resources.

[2] de Villiers Scheepers, M. J., Mealy, E., Clements, M., and Lawrence, A., 2018. Regional entrepreneurship ecosystems support: South East Queensland case study. In: A. O'Connor, E. Stam, F. Sussan and D. B. Audretsch. Entrepreneurial ecosystems: Place-based transformation and Transitions. Springer. pp. 101-130.

[3] Remplan, 2020. Economy, Jobs and Business Insights and GW3, 2019. Regional Economic Profile.

Emerging research from USQ's institute for resilient regions highlight the challenges of promoting entrepreneurial activity within the Isaac region in Moranbah. Basson and Erdiaw-Kasie[4] find that although entrepreneurship has the potential to facilitate development, it is suppressed within a two-stream economy of the prosperous mining, and less prosperous non-mining sector. The dominant mining sector tends to suppress entrepreneurial activity, and the status and rewards are low for entrepreneurs to venture under such conditions.

- Proximity: The region has a low population density of 0.12 persons per hectare, compared to 8.76 persons per hectare in Brisbane. Higher population densities and geographical proximity are associated with increased knowledge flows and innovation.

- Open boundaries: Permeable boundaries facilitate interactions between regional community members and roles outside the region, as this is needed to acquire resources and knowledge beyond a region and attract talent or investment.

- Support enablers: Entrepreneurs and business owners require varied resources such as financial, social, human and technological resources, as well tangible infrastructure, to grow and develop their business ventures.

## 2.2. Rigour in the RIB research report methodology

GW3 embraces an evidence-based approach to economic development to underpin economic diversification in the MIW region. While the coal mining industry is dominant in the region, there is a recognition of the role that entrepreneurship through personal initiative and small firms play to enact new innovations and contribute to industrial diversification.

This report provides findings based on a rigorous research design, focused on measuring firm-level innovation and ecosystem support to bring about a resilient region, which is discussed in detail in Appendix A.

1. Firm-level innovation is assessed using an internationally recognised framework developed by the Centre of Business Research (CBR), Cambridge University, which has been used in Australia, and internationally and is endorsed by the OECD (2018) Oslo Manual for innovation[5].
2. Ecosystem resilience was assessed using an expert survey of professionals who fulfill crucial roles within a region. These respondents evaluated their own role and the roles of others, using a 360-degree assessment, based on economic, social and institutional dimensions.

The findings in this report demonstrates GW3's commitment to an informed, evidence-based approach to support ongoing regional development, share knowledge and promoting the progress the MIW region has made in the last three years.

[4] Basson, M. and Erdiaw-Kwasie, M. O., 2019. Entrepreneurship under siege in regional communities: Evidence from Moranbah in Queensland, Australia. Journal of Rural Studies, 66, pp.77-86.

5 OCED, 2018. Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition.

## 2.3. What is being measured?

### 2.3.1. Firm innovation performance

Firm innovation performance assesses innovation activities, processes and outcomes of 97 firms in the region using a survey design. Firms were asked to review their innovation activities for the year ending December 2020. Data was collected from January 2021 to April 2021. The responses were analysed and compared to available innovation data from 2019 and 2014 relating to Queensland and Australian firms. The innovation activities, processes and outcomes in this report are presented by comparing:

- Innovation types and breadth of innovative activity;
- Business goals and innovators' business practices;
- Collaboration and Research and development (R&D) activities;
- Innovation performance outcomes; and
- Awareness and use of available support to regional firms.

### 2.3.2. Community resilience of the innovation ecosystem

Innovation ecosystems are expected to deliver outcomes such as job creation and investment, yet these ecosystems can also have both positive and negative impacts on other social, institutional, and individual aspects of a regional community. Innovation ecosystem development globally may achieve rapid employment and economic growth at the expense of diversity, equity, infrastructure, and other social and community impacts.

The community resilience assessment of the innovation ecosystem takes a holistic view of the contribution of the ecosystem to a region. Community resilience is used to understand this contribution, focusing on economic, social, and institutional aspects of resilience. Community resilience assesses a business community's readiness to adapt and change. Specially community resilience for entrepreneurial regional communities is defined as:

> *The existence, development, and engagement of community resources by members to thrive in a dynamic environment characterised by uncertainty and unpredictability.*

This study focuses on the economic, social and institutional dimensions of community resilience, as these are strongly related to innovation-driven entrepreneurship[6].

Community resilience dimensions were assessed through an expert survey distributed across several regions in Queensland, targeting 12 organisational roles within each region. These roles were selected based on their prominent contributions towards regional innovation ecosystems. The identified roles invited to participate in the research are:

[6] Renando, C. 2021. *The role of the innovation hub in contributing to community resilience*, Unpublished doctoral dissertation, University of Southern Queensland, Queensland, Australia.

- Chamber of commerce / Local business communities (advocate and networking for local business)
- Large and well-established company
- Economic development organisation - other than government, chamber, or industry peak body (e.g. RDA, MBRIT, TSBE, GW3, and Advance Cairns)
- Education provider (including TAFE and training organisations)
- Government (including local, state, and federal government)
- Incubator (including coworking spaces, innovation hubs, and other dedicated entrepreneur support spaces)
- Local investor group
- Local small-to-medium (SME) business (other than service provider)
- Peak body or industry group (organisations that advocate for a particular industry interest)
- Service provider (including professional services, such as IT, legal, finance, marketing, consultants)
- Primary school / high school
- University and/or research institute

# 3. Benchmarking and Sample

## 3.1. Benchmarking process

The data presented in this report is available to all GW3 partners who support and promote innovation, local firms in the MIW region and other stakeholders. It is intended to identify current practices and performance of firms and ecosystem support organisations to determine how the MIW region as a whole is performing in areas of entrepreneurship and innovation compared to other regions, and to identify the differences between innovator and non-innovator firms and determine what future actions can be undertaken to improve innovation and entrepreneurship performance.

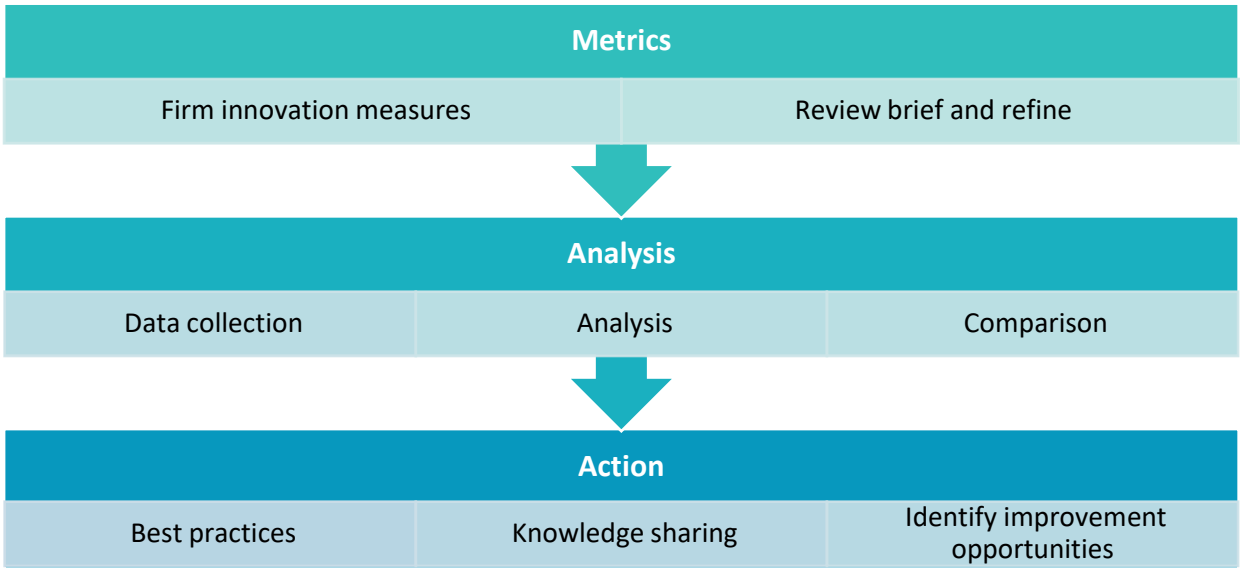



***Figure 1:*** *Benchmarking process*

## 3.2. Which firms are part of the firm innovation benchmark?

The data used for this benchmark of MIW firms, was collected from 97 firms during the first three months of 2021. These include firms based in Mackay and Whitsundays predominantely, as well as a small portion of firms in the Isaac region. The data has been weighted using Australian Bureau of Statistics (ABS) weights to fit the region's size, age and industry profile. The MIW sample was compared with 2019 South East Queensland data of 248 firms and the 2014 Australian firm innovation data. The total dataset consists of 1,754 firms. Differences are reported as statistically significant at the 95% confidence interval.

### 3.2.1. Mackay Isaac Whitsunday sample

Sample respondents comprised:

- 79.6% owner-managers, consisting of 60% men and 40% women.
- 52% small firms (employing 19 or less people).
- Representatives of a range of firms from start-ups of less than three years (9.3%), to established firms older than 20 years (21.6%), as shown in Figure 2.
- 78.4% holding a post-secondary qualification.

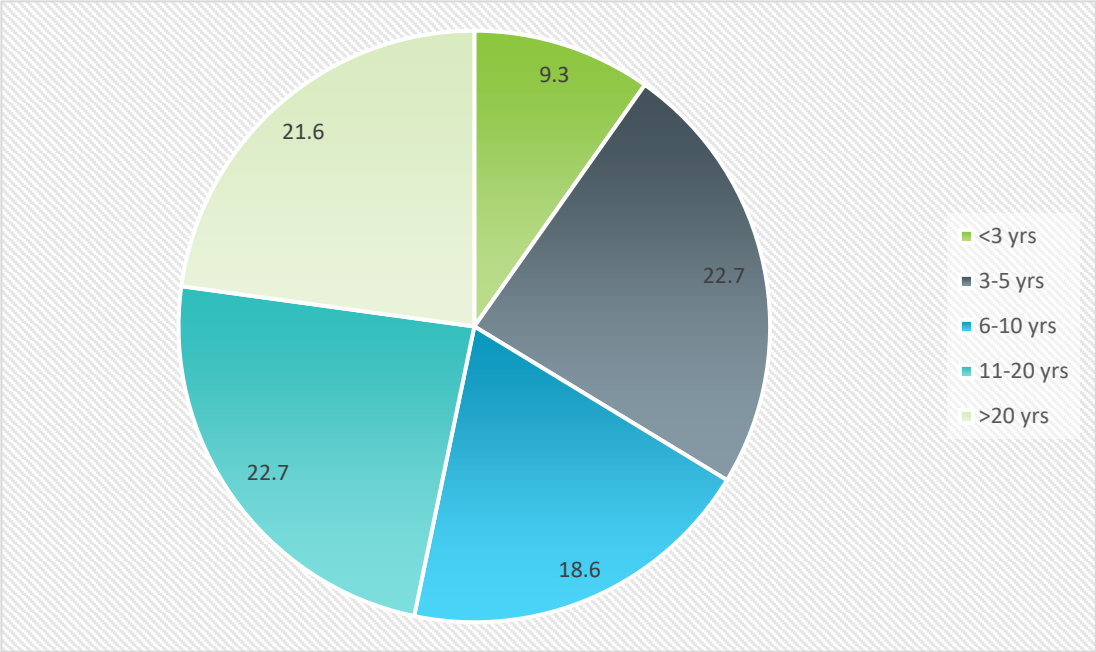



***Figure 2:*** *Age intervals of responding firms expressed in percentage terms*

### 3.2.2. Respondent firm industries

The primary activities of firms were categorised in sixteen industries, based on the 2016 ANZIC classification. In the unweighted sample, most responding firms were part of the manufacturing industry (13.4%), professional, scientific, and technical services (including legal, accounting services) industry (12.4%), retail trade (7.2%), and agricultural sector (7.2%), as indicated in Figure 3, thus indicating the need to weight the sample to avoid sampling bias.

MIW data was weighted to limit response bias, meaning that responses from firms of different sizes and industries were weighted in proportion to their presence in the general population of Australian firms.

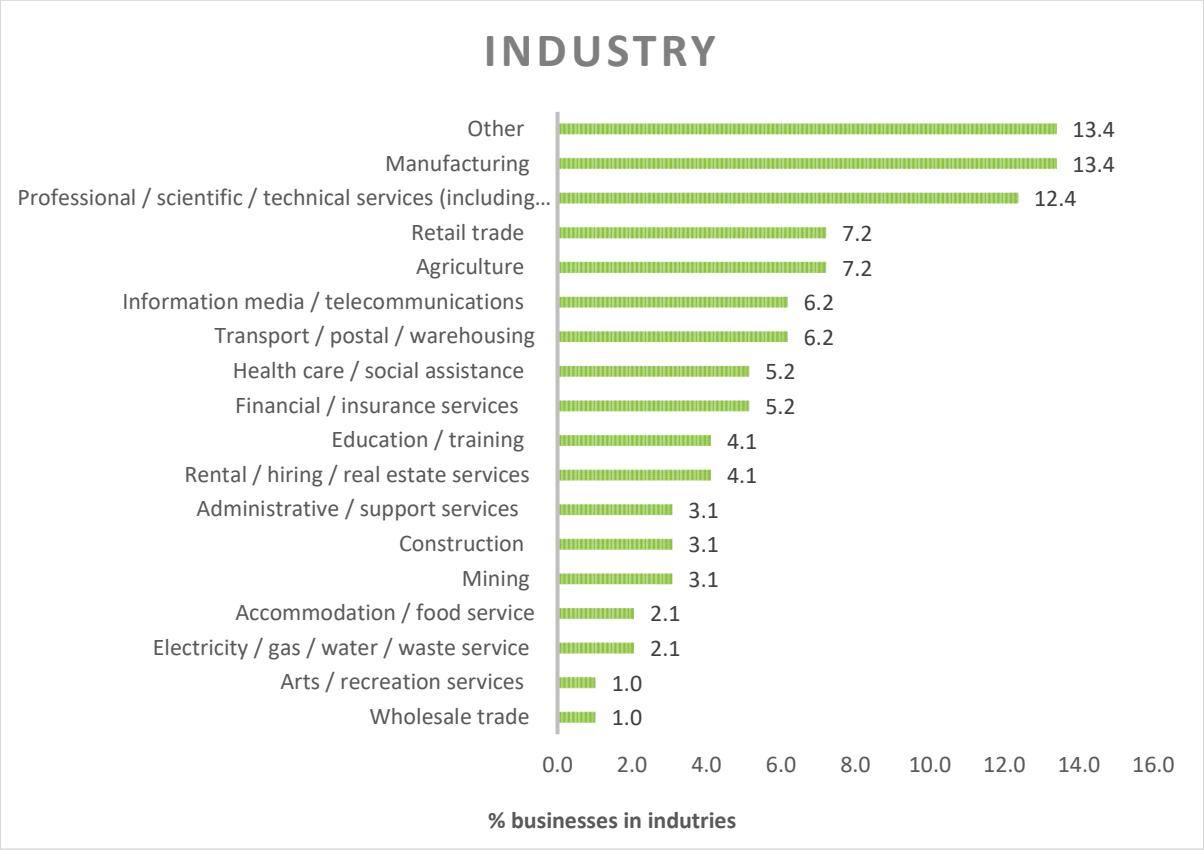



***Figure 3:*** *Industries of firms expressed as percentage*

### 3.2.3. Turnover of firms

63% of responding firms had less than or equal to $500,000 annual turnover, with only 10.4% of responding firms having indicated a $5 million and more annual turnover, as shown in Figure 4.

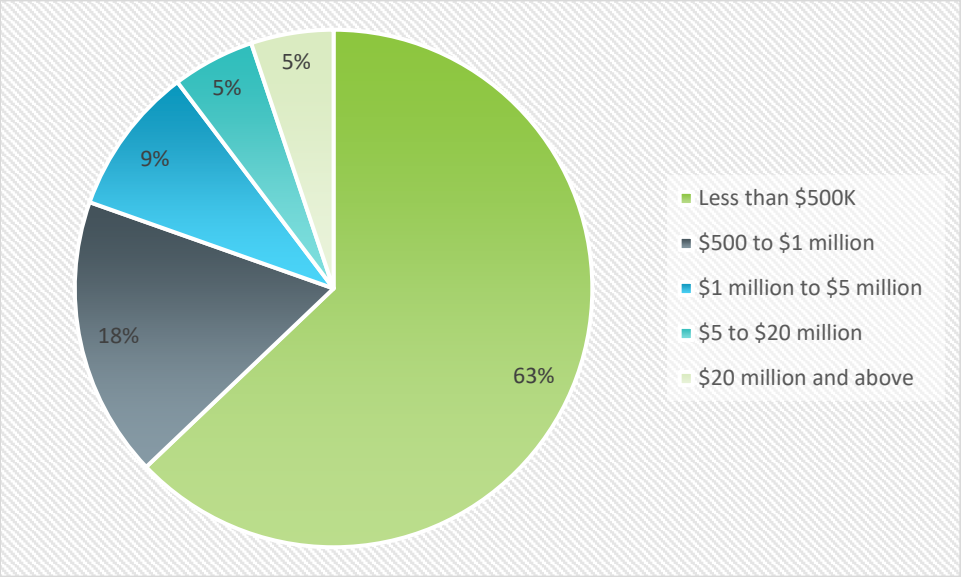



***Figure 4:*** *Annual turnover by firm as percentage*

# 4. Innovation

The innovation activities within firms can be classified according to four types of innovation, and three categories of novelty, based on the degree of newness.

Accordingly when respondents were asked about innovation, they were presented with the explanation that innovation refers to new or significantly improved products or services introduced to the market, or new or significantly improved production or delivery methods used commercially, requiring changes to knowledge, skills, routines and practices to make these new products or introduce these new processes. Purely aesthetic changes or minor design or presentation changes that does not improve the value or performance to the customer is not regarded as innovation.

After the explanation, respondents were asked to indicate the relative newness (no innovation, new to the firm and new to the firm and industry) of products, services and process activities, as well as a range of business practice innovations.

Firms were considered 'innovators' if they applied innovation across several innovation types and showed a high degree of relative newness related to the innovations implemented in the last three years.

## 4.1. Innovation types

***Innovation refers to:***

- ***Product/service innovation*:** when a new or significantly improved manufactured product, or service product is introduced to the market (product innovation).
- ***Methods innovation***: when a new or significantly improved production, or delivery method is used commercially (process innovation),
- ***Process innovation*:** when changes in knowledge or skills, routines, competence, equipment, or engineering practices are made to develop or make the new product, or to introduce the new process.
- ***Business practice innovation*:** when new or significantly improved business practices are introduced, such as organisational practices, new media or marketing techniques, new human resources practices, or technological improvements in the supply chain.

## 4.2. Innovation novelty

*The degree of newness was categorised as:*

- ***New-to-the-industry***: High degree of novelty, meaning these innovations take longer to be adopted, as customers and staff may be unfamiliar with how the innovation works and its

benefits, therefore need to be educated. New-to-industry innovators are those that reported at least one type of product, service or process innovation that was new to the industry.

- ***New-to-the-firm**:* Medium degree of novelty, which means customers and other firms may be familiar with the innovation. New-to-the-firm innovators are those that reported at least one type of product, service or process innovation that was new the firm, but not new to the industry.

- ***No innovation**.* Firms who did not report innovation in any of the six product, service or process innovation types.

## 4.3. Mackay Isaac Whitsunday firms focus

### 4.3.1. Innovation novelty benchmarked

Innovation activity, in the unweighted MIW sample, is low with 15% of firms classified as innovators, while 85% are classified as non-innovators. The classification is derived from the novelty of innovation that firms implement, as well as the types of innovations that firms pursue. Innovators tend to implement new-to-the-firm and new-to-the industry innovations across a number of areas such as products, services, practices and business practices.

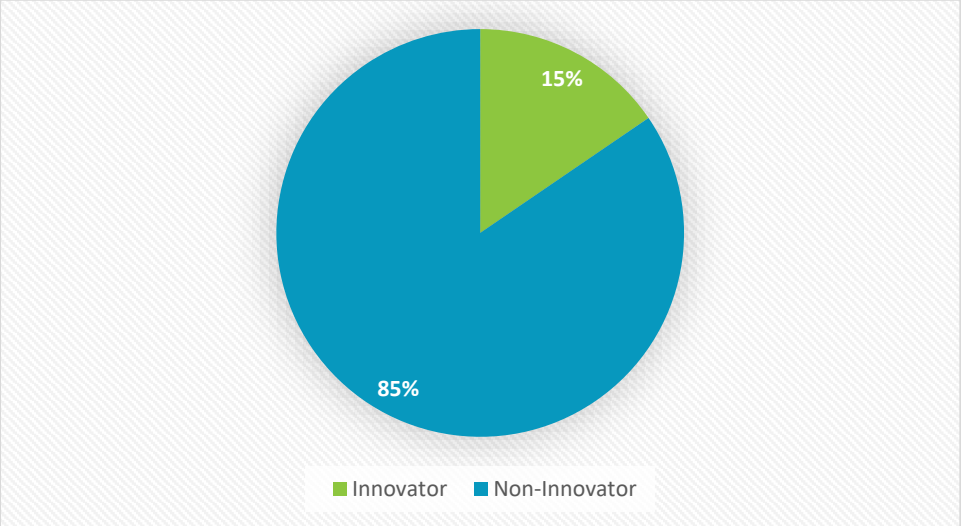



***Figure 5:*** *Unweighted MIW sample of innovators compared to non-innovators*

### 4.3.2. Types of innovation: Innovation breadth

Innovation breadth refers to the implementation of different types of innovation across a range of business functions measured by several variables across four categories: products and services, operational processes, organisational or managerial processes and marketing methods.

MIW respondents indicated that they introduced new-to-the-firm innovations in human resource practices (34%) and new organisational and managerial processes (29.9%), shown in Figure 6. This is expected, given the impact of COVID-19 on how work took place in 2020. A high number of new-to-the-firm products and services with social impact (29.9%), new production and delivery methods (28.9%), new products (28.9%) and new media or promotion techniques (27.8%).

New-to-the-industry innovations were low generally, similar to other regional areas. Most of these innovations were novel products (5.2%), services (3.1%), and products and services with social impact (3.1%). These novel innovations have the potential to appeal to international markets and to generate wealth in the region.

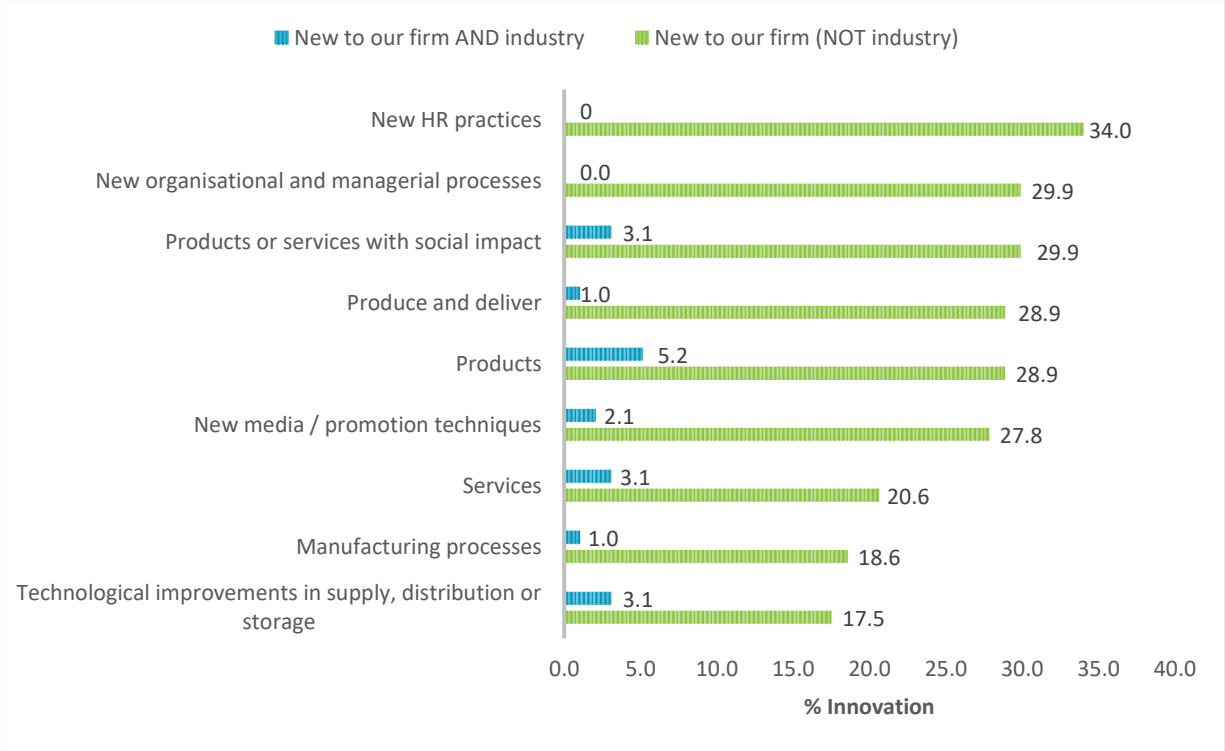



***Figure 6:*** *Innovation breadth: Degree of novelty in across several types of innovations*

### 4.3.3. Innovation novelty by firm size

Considering firm size and innovativeness the findings reveal that medium-sized MIW firms of 20 or more employees were the most likely to introduce innovations, followed by micro firms, as indicated in Figure 7. This could be ascribed to the nature of the market in the region. Medium-sized firms that tend to target sectors such as the mining, retail or agricultural sector need to have knowledgeable staff to implement innovations, while small and micro firms may target a niche, as they have limited managerial and staff capacity to devote to innovations.

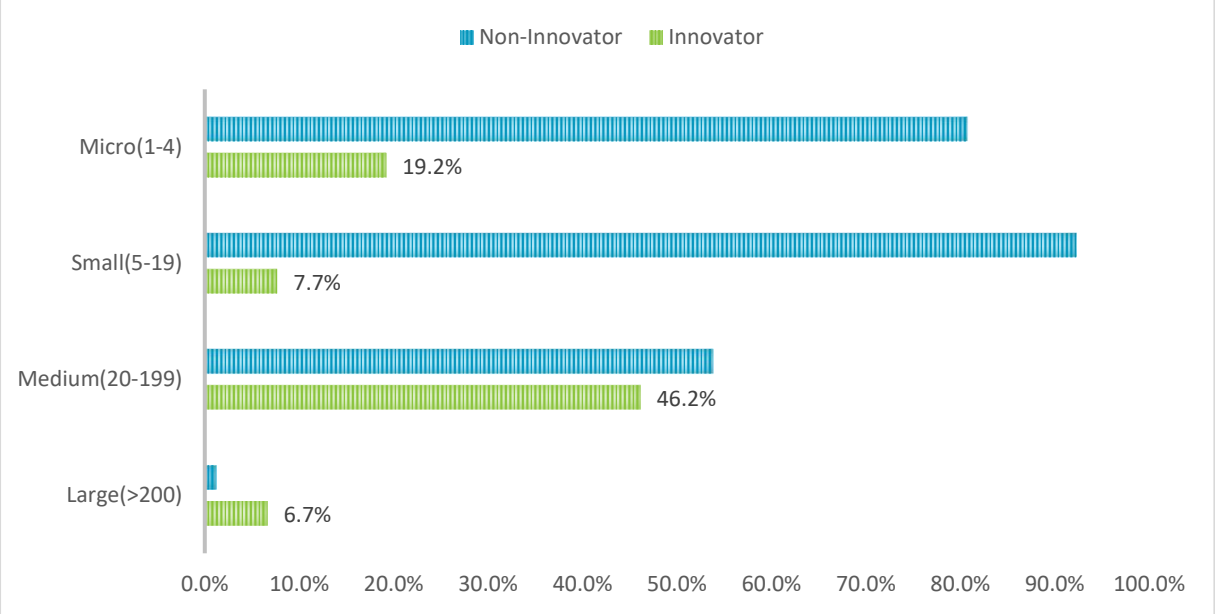



***Figure 7:*** *MIW firm size and innovation compared*

### 4.3.4. Innovation novelty by firm age

Comparing firm age and the degree of innovativeness the findings show that MIW firms, between 3 to 10 years old were most likely to introduce innovations (66.6%), while 20% of firms older than 20 years still introduced innovations, as shown in Figure 8.Innovation tends to decline as firms become older, yet MIW established firms keep innovating to maintain their competitiveness and relevance in the market. This is likely due to the fact that they serve large multinational business customers.

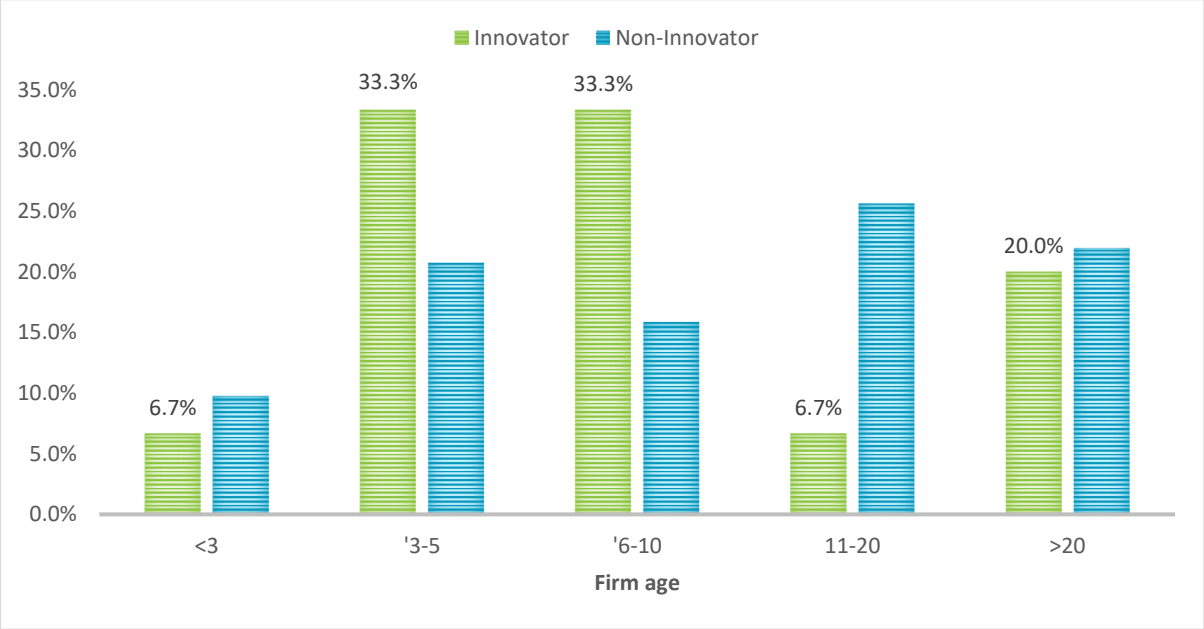



***Figure 8:*** *MIW firms' innovation compared to firm age in years*

### 4.3.5. Innovation novelty by annual turnover

Innovator firms were found in all the turnover categories, as shown in Figure 9, in the MIW sample, however most firms had annual turnovers of less than $500,000.

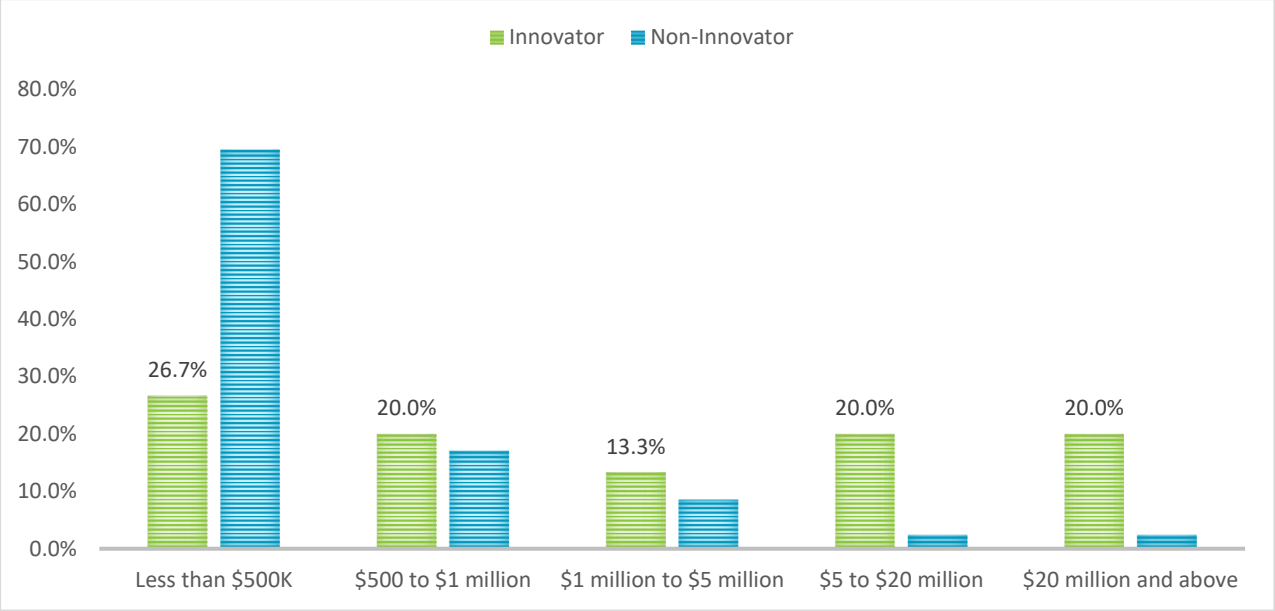



***Figure 9:*** *Innovativeness compared by annual turnover for MIW firms*

## 4.4. Innovation benchmarked longitudinally

### 4.4.1 Innovation novelty benchmarked

To benchmark the innovation activity of MIW firms, the sample needed to be weighted to be comparable to the firms in the larger database with firms from Queensland, Australia and the 2019 data collected from South East Queensland. Sampling weights from the Australian Bureau of Statistics were used in relation to business size and industry to compensate for sampling bias and to ensure reliable, valid comparisons. After weighting the data, the innovation activity of firms can be benchmarked as shown in Figure 10. Firm innovation activity in the MIW region is 8.5%.

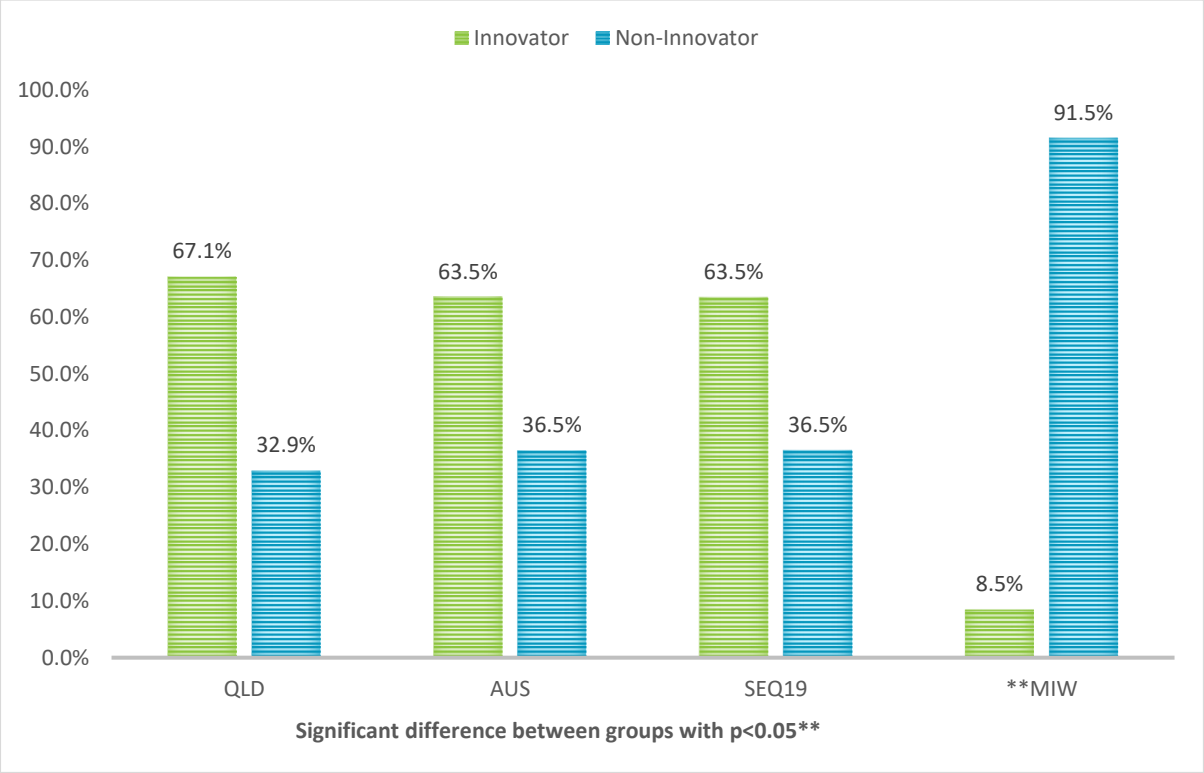



***Figure 10:*** *Innovation activity benchmarked: MIW, SEQ, Queensland and Australian firms.*

### 4.4.2 Innovation novelty by firm size benchmarked

Considering firm size and innovativeness the findings reveal that micro firms in all regions and over time were most likely to introduce innovations, as indicated in Figure 11. This is also the dominant firm size in Australia, followed by innovations introduced by small firms.


***Figure 11:*** *Innovation novelty by firm size benchmarked: MIW, SEQ, Queensland and Australian firms.*

### 4.4.3 Innovation novelty by firm age benchmarked

Benchmarking firm age and the degree of innovativeness, some differences are evident between regions. The MIW region has the largest percentage of innovators (80%) between 3 to 10 years old, compared to Queensland firms of 9.1%, Australian firms of 18.7% and SEQ firms of 37.1%, as shown in Figure 12.

55% of Queensland firms and 48.1% of Australian firms older than 20 years remain innovative.

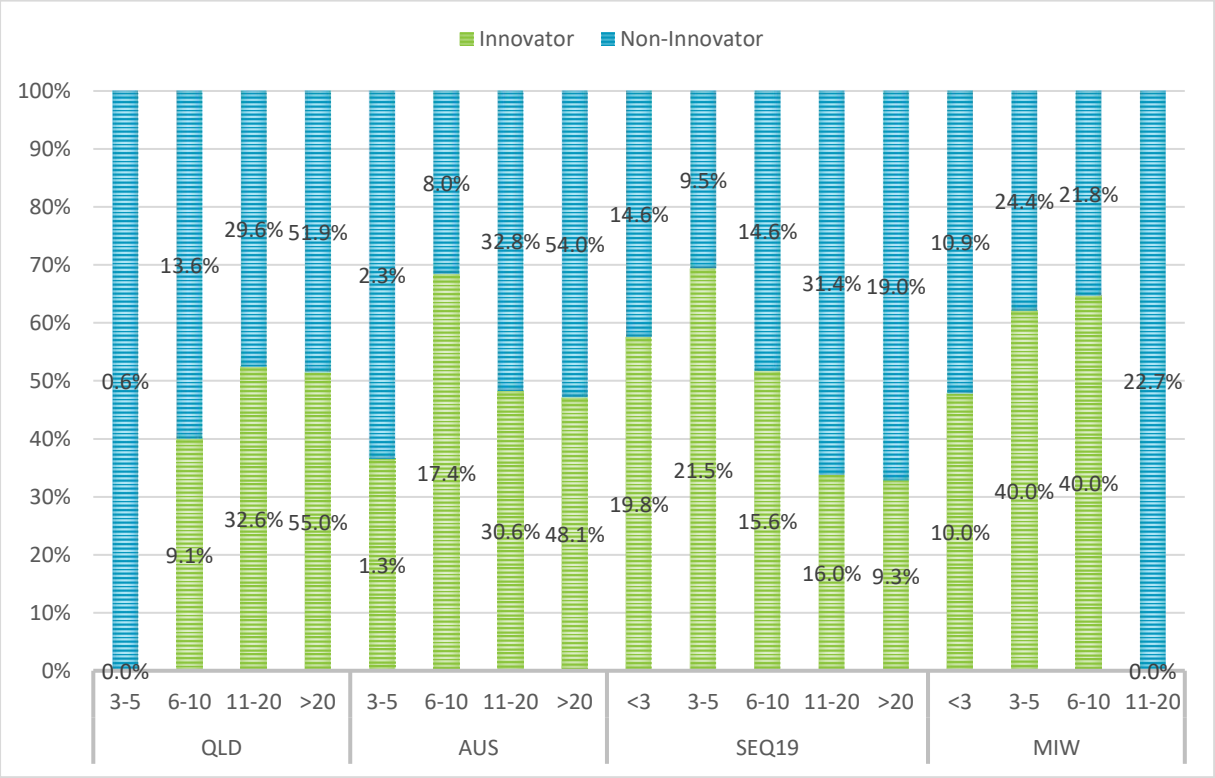



***Figure 12:*** *Innovation novelty by firm age benchmarked: MIW, SEQ, Queensland and Australian firms.*

## 4.5. How innovations were developed

Firms were asked to indicate if innovations were developed mainly within their business group, adopted after development by other businesses or institutions, or in collaboration with others.

As shown in Figure 13, most firms adopt innovations mainly within their own business group, then adopt innovations after it has been developed by other businesses and institutions, and then in collaboration with other businesses or institutions. Significant differences are evident between regions.

In the MIW region both innovators and non-innovators were more likely to adopt innovations within their own group. However, innovators were more likely to adopt innovations developed in collaboration with other organisations, while non-innovators were more likely to adopt innovations developed by other organisations. This data suggests that MIW innovators are more inclined to collaboratively innovate, than non-innovators in the region.

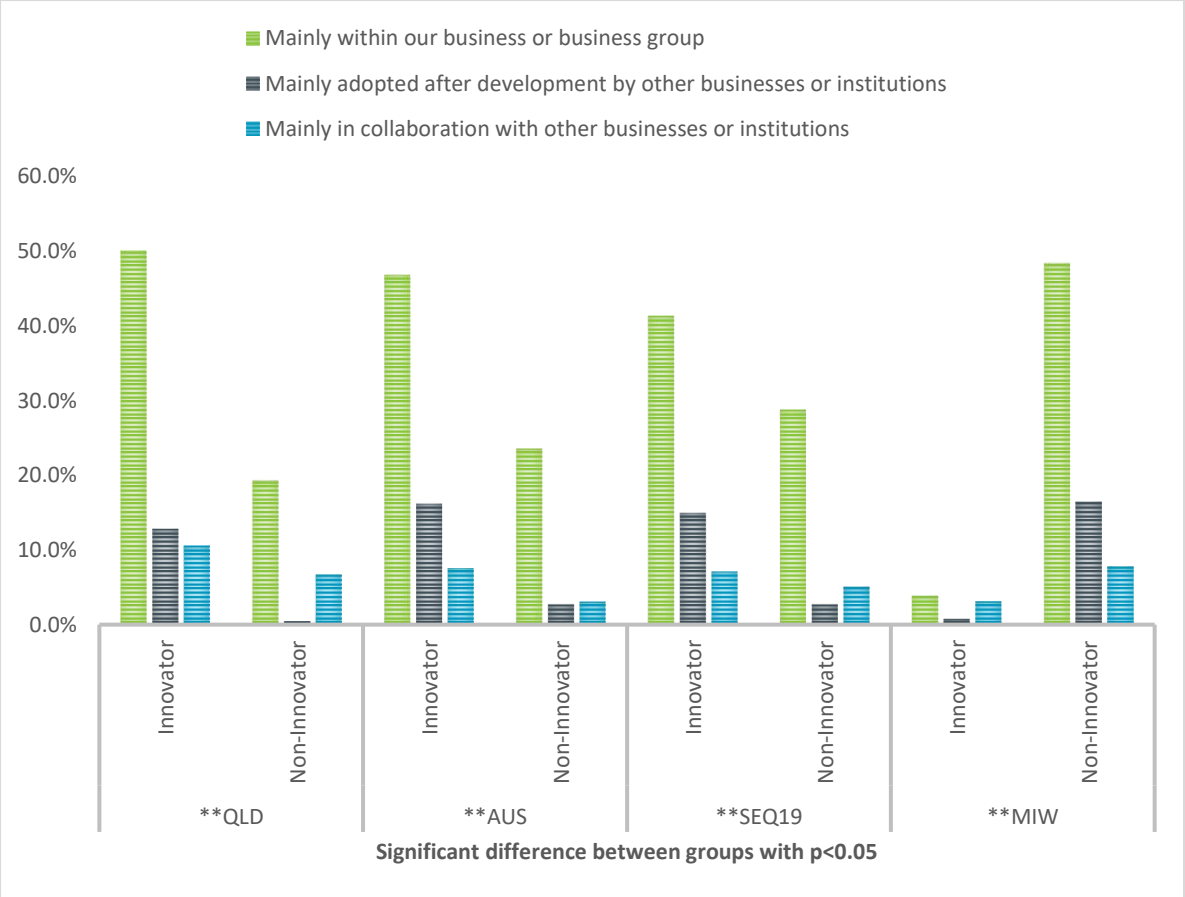



***Figure 13:*** *Ways in which innovations are across MIW, SEQ, Queensland and Australian firms*

## 4.6. Sources of innovation

Firms were asked to indicate their sources of innovation. Sources of innovation are categorised into internal and external sources, as ideas for innovations can come from employees internally, or through suggestions from customers, suppliers, or knowledge generated outside the firm.

For MIW firms, the top five sources of innovations were clients or customers, sources within the firm, suppliers, and digital networks.

In terms of knowledge-based innovation sources, MIW innovators were significantly more likely than Queensland or Australian firms to source innovation ideas from professional conferences, trade associations, and government and research institutes.

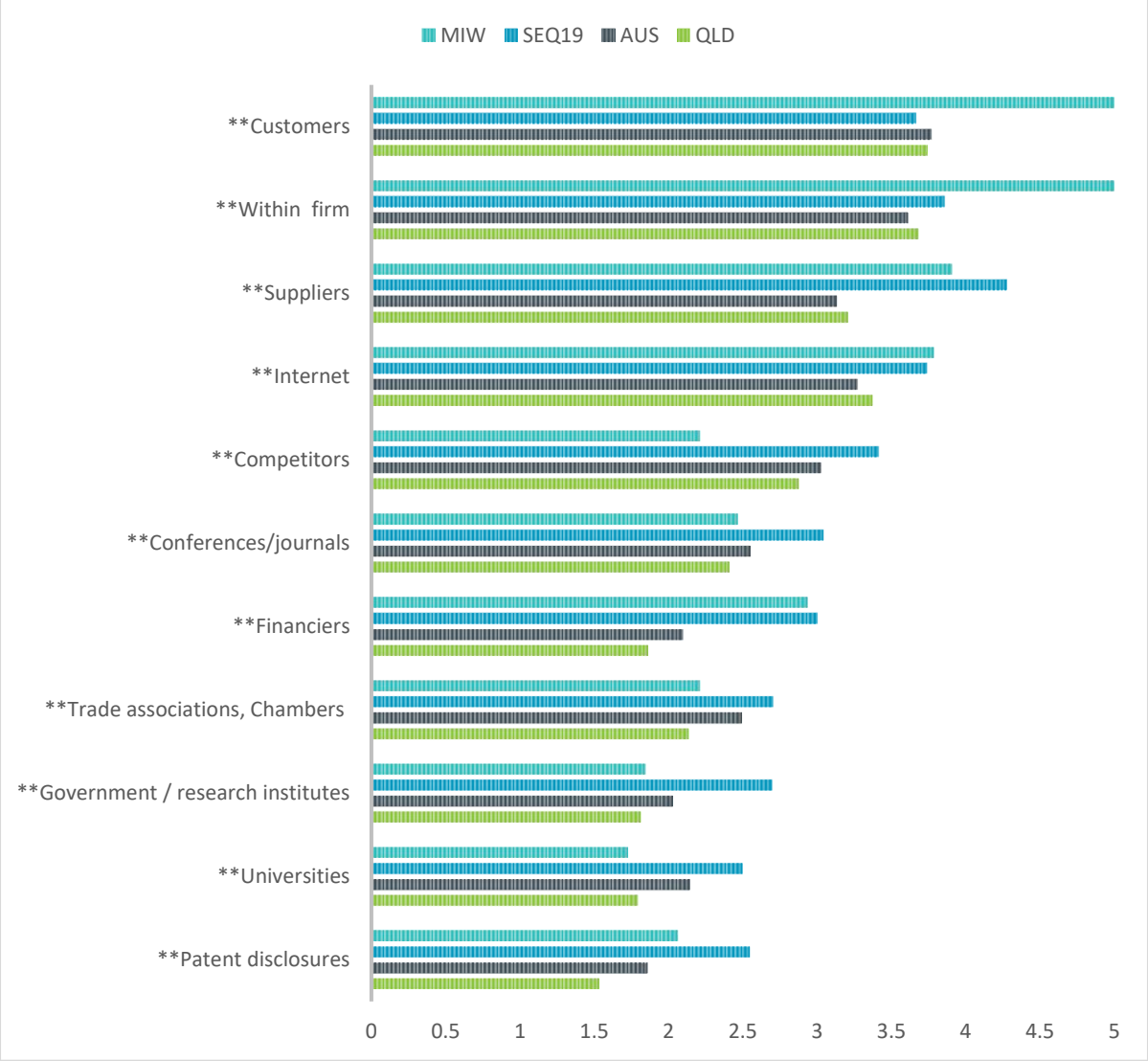



***Figure 14:*** *Sources of innovation among innovators, measured on 5-point scale in order of importance*

# 5. Business goals and antecedents of innovation

## 5.1. Motivation for starting a business

Firms were asked to indicate their main motives for starting a business. Their motives were grouped into the following categories: unemployment, wanting to run their own firms, having a new idea and wealth ambitions.

MIW innovators were most likely to motivated by wealth ambition (12.5%), while non-innovators were motivated by wanting to run their own business (94.6%), or to avoid unemployment (92.9%). Innovators in all regions regard having a new idea as a key motive to start a business, shown by the motives of Queensland firms (77.9%).

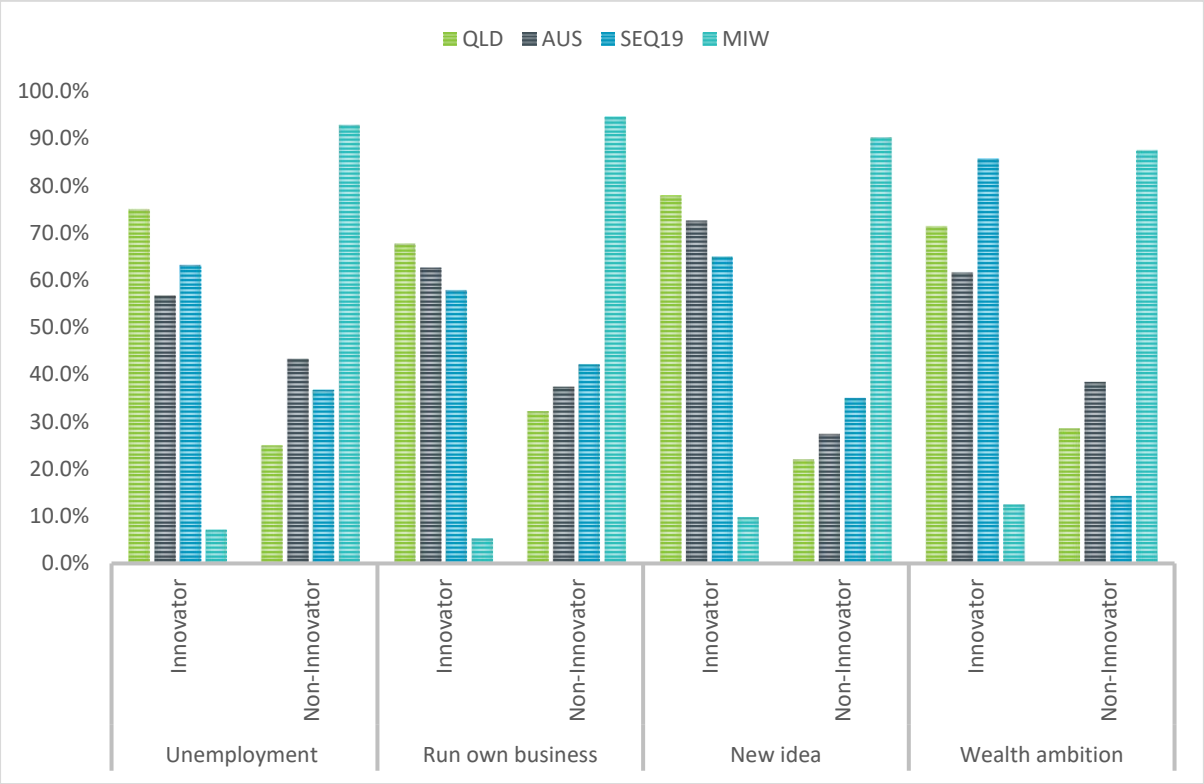



***Figure 15:*** *Comparing innovators' and non-innovators' motivation to start a business across all regions.*

## 5.2. Personal business goal

Firm owners/managers were asked to rate the relative importance of their personal goals for the firm on a 5-point scale in relation to the freedom to set and pursue their own objectives, creating a lasting legacy, contributing to the well-being of stakeholders, learning and growing through the business, increasing their personal and family wealth, and increasing the value of the business for capital gains.

MIW firms showed significant differences in the personal goals they viewed as important. Innovators in the MIW region regarded contributing to the well-being of stakeholders, learning and growing through the business, the freedom to set and pursue their own objectives, and pursuing personal and family wealth as relatively more important, than innovators in other regions.

Most firms pursue innovation to increase stakeholder wellbeing. This is aligned to the triple-bottom-line approach; where the pursuit of value creation for all stakeholders, benefits the owner, their family, firm employees, customers and the greater community.

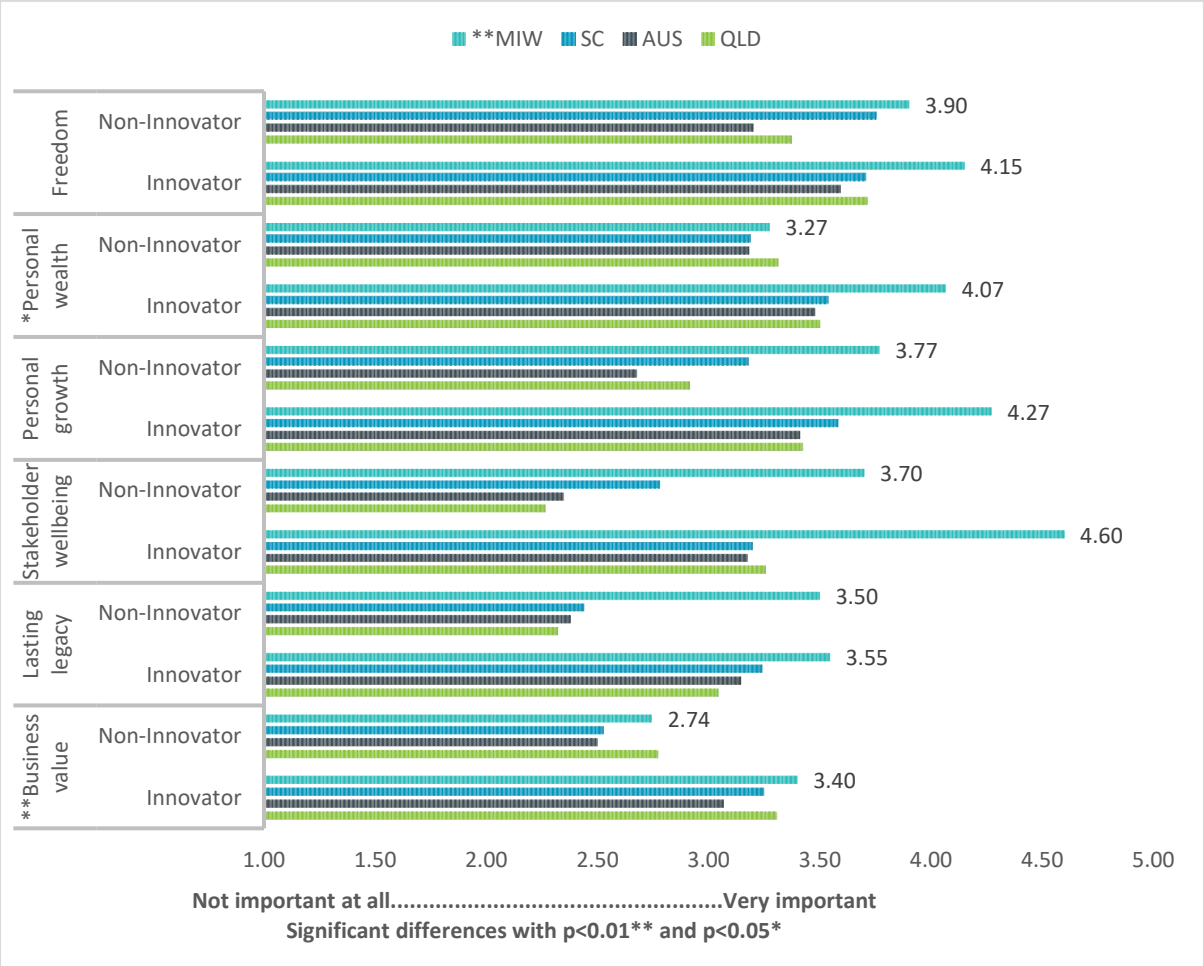



***Figure 16:*** *Comparison of relative importance of personal goals*

## 5.3. Business practices

MIW firms embrace contemporary business practices such as having an innovation strategy, monthly accounts, a board of directors and digital practices such as using a website for trading and using a social media strategy. There is a significant difference between MIW firms and firms across SEQ, Queensland and Australia, as both innovators and non-innovators adopt these practices. This can be explained, in part, by the year of data collection, as digital adoption increased rapidly among innovators and non-innovators alike in 2020[7].

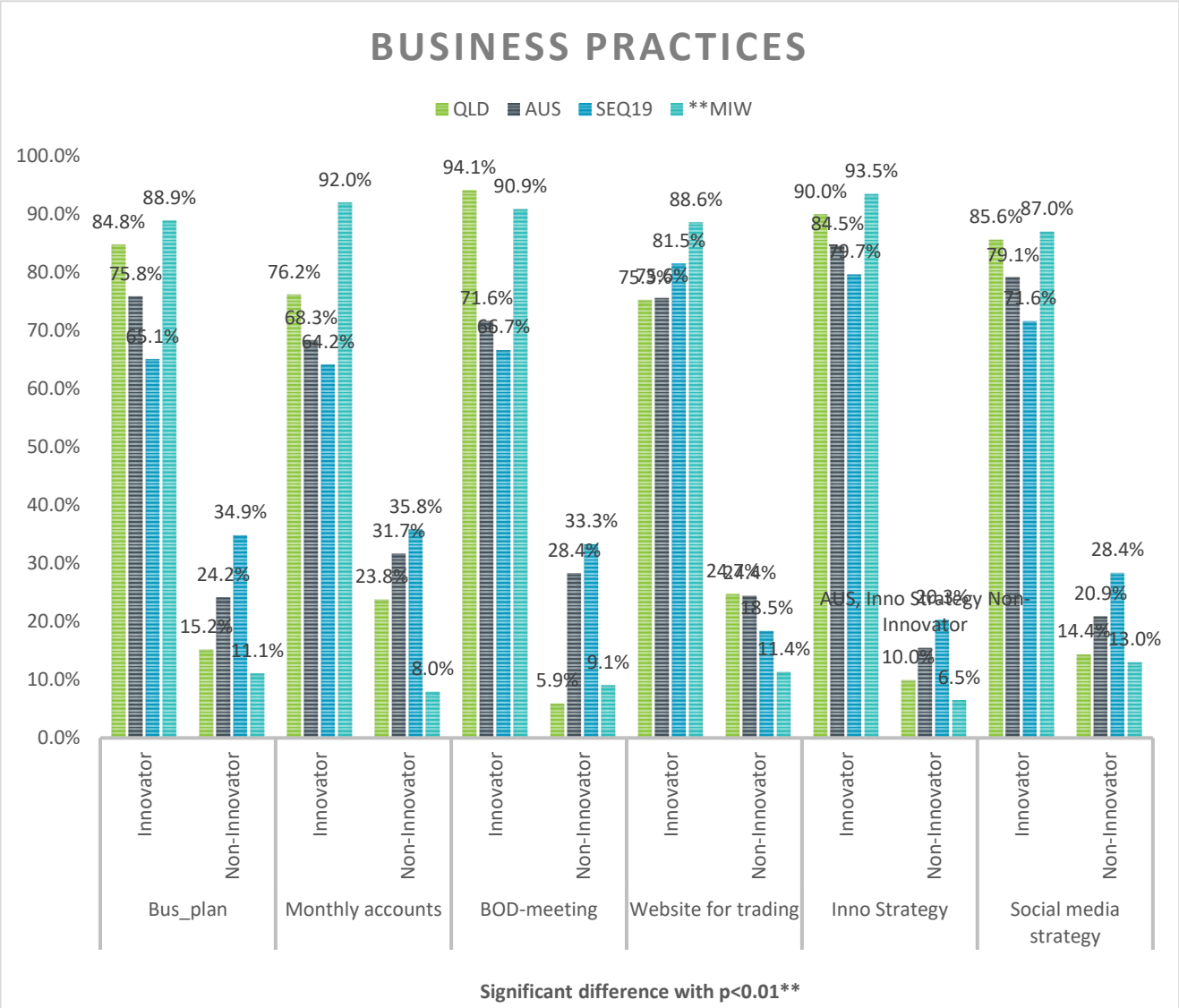



***Figure 17:*** *Business practices compared*

[7] Baig, A., Hall, B., Jenkins, P., Lamarre, E. and McCarthy, B., 2020. The COVID-19 recovery will be digital: A plan for the first 90 days. McKinsey Digital.

Innovations related to the Fourth industrial Revolution (4IR) build on the digital revolution by fusing technologies in the physical, digital and biological spheres. Technologies associated with this revolution emphasise speed and non-linearity and will transform the world of work through mobile devices with unprecedented processing power, which integrate digital and physical experiences through novel innovations in fields such as artificial intelligence, robotics, the Internet of Things, autonomous vehicles, 3-D printing, nanotechnology, biotechnology, materials science, energy storage, and quantum computing. In the MIW region these trends are recognised and form part of a regional transformation strategy.

Innovators who have adopted some of the technologies and practices associated with 4IR use business intelligence systems to provide key metrics automatically, data integration across functional areas for business improvement and smart technologies. Figure 18 shows that more than a quarter of MIW innovators embrace 4IR practices.

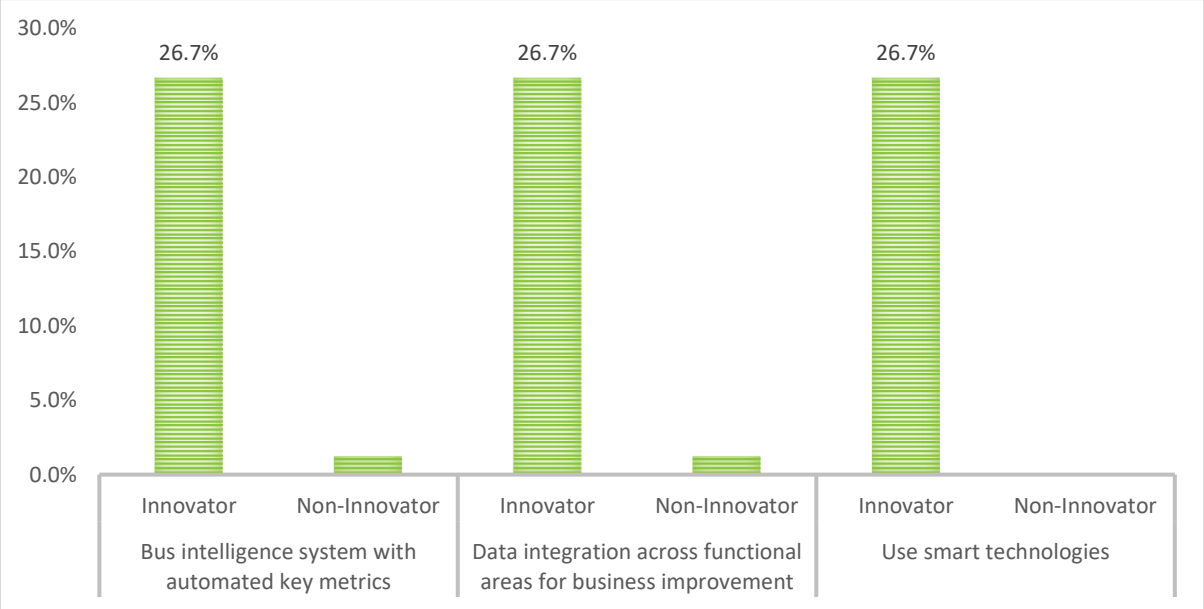



***Figure 18:*** *MIW firms who use 4IR business practices*

## 5.4. Business Exit

MIW innovators top three ways to exit their business is being purchased by another business in the next five years, using up the capital assets and exiting and an employee/management buy-out or winding down the business and exiting (see Figure 19). However, in South East Queensland firms top three ways to exit their businesses is winding down the business, being purchased by anther business, or winding down the business to exit. While MIW and SEQ firms both equally considered being acquired by another business and using up the capital assets to exit a business, SEQ businesses were more likely to consider transferring ownership to family members, which suggest that family business ownership is more prevalent in this region.

Business owners that consider business exit tend to view their business as an asset, rather than a job and are more likely to pursue business growth to increase the value of that business.

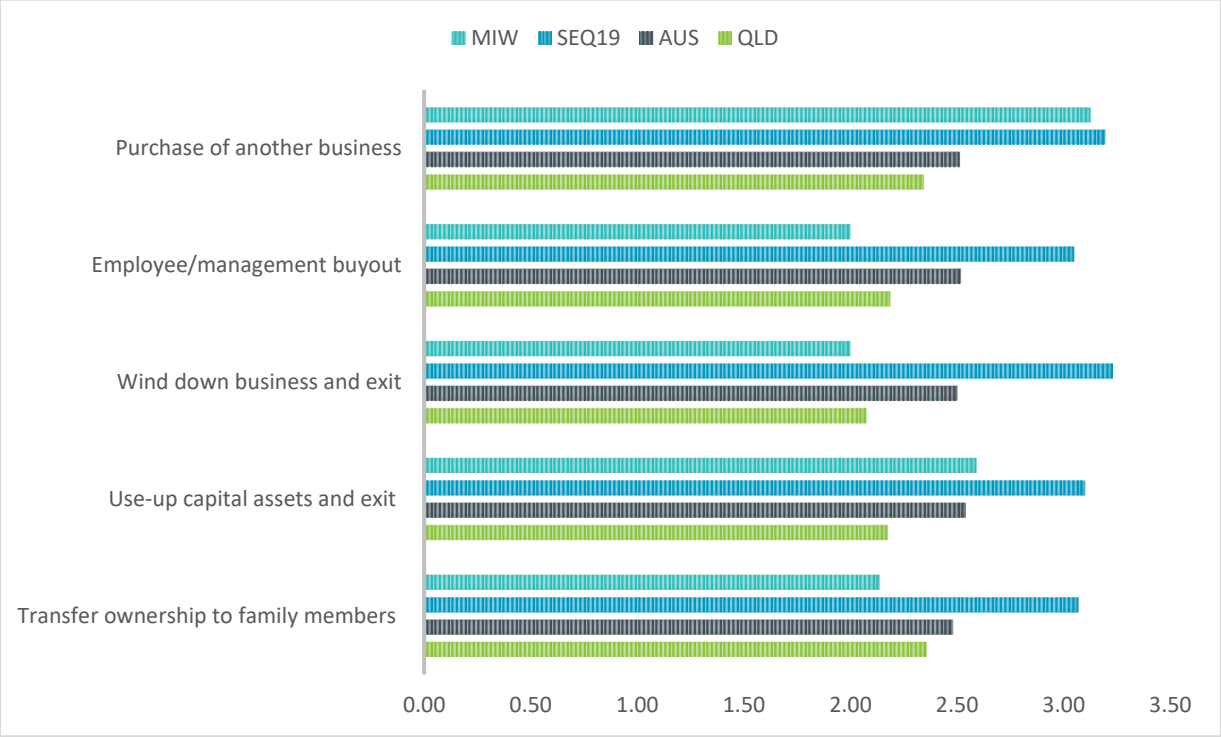



***Figure 19:*** *Comparison of innnovators likelihood to exit the business within the next five years on a 5-point scale.*

# 6. Fundamentals of innovation

## 6.1. Research and development (R&D)

Across all regions, few firms engage in research and development (R&D), with most Australian firms indicating they were not involved in R&D activities.

In the MIW region there is no statistically significant difference between innovators and non-innovators engagement in R&D activities, however for SEQ, Queensland and Australian firms' innovators are more likely to indicate that they are engaged in R&D activities, as depicted in Figure 20.

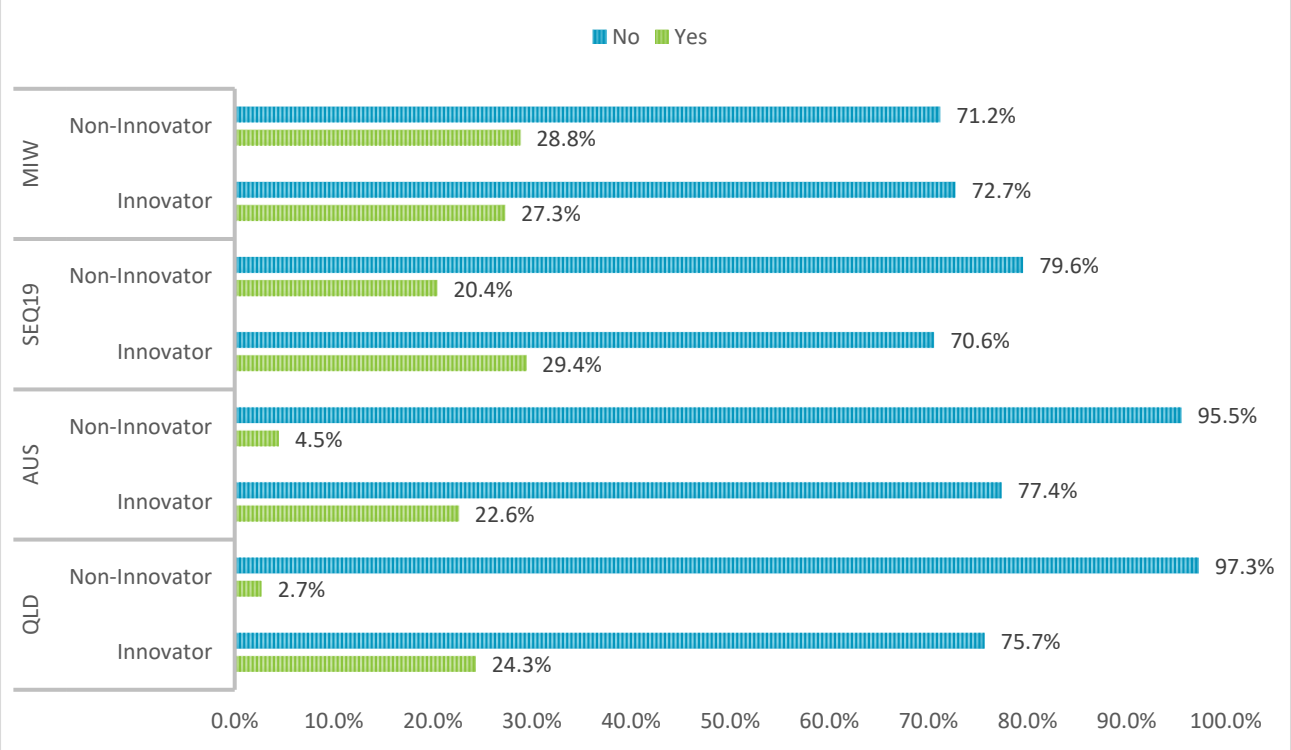



***Figure 20:*** *Comparison of research and development (R&D) engagement.*

Given the prevalence of micro firms across Australia, R&D activity is generally limited as these firms have limited staff capacity to engage in R&D. However, in the MIW region both innovator and non-innovator micro firms report dedicating staff time towards engaging in research and development. This could be ascribed to the highly competitive nature of dominant industries such as mining and manufacturing in the region.

## 6.2. Collaboration

Research has shown the benefits of collaboration to generate more innovations[8] and how these are likely to improve productivity, economic growth and quality of life improvements. Collaboration can be formal or informal and offer benefits for firms such as knowledge sharing and acquisition, learning new competencies, and sharing risks and costs[9]. However, firms who collaborate may need to give up a level of control and accept that collaboratively innovating may be slower, as more consultation is needed[10].

Collaboration tends to be higher among innovators, compared to non-innovators, as shown in Figure 22. MIW innovators are highly collaborative (70%), compared to non-innovators and Queensland and Australian firms. However, it should be borne in mind that the sample of MIW innovators in this study is small.

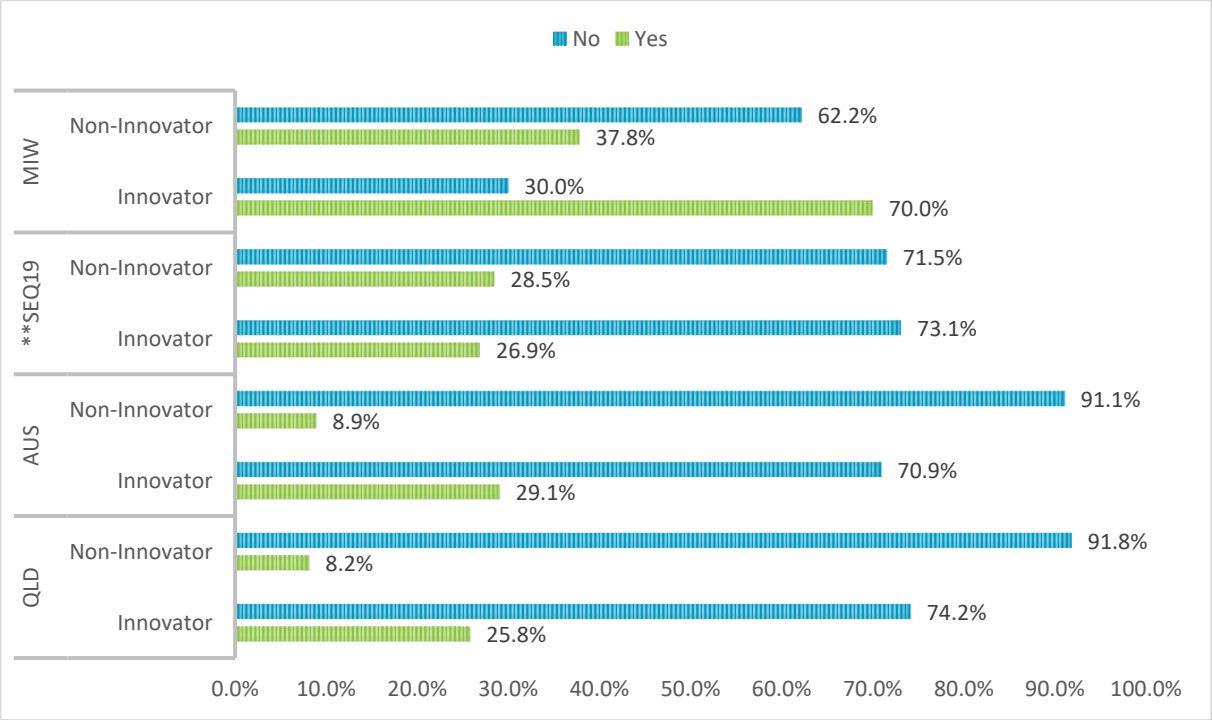



***Figure 21:*** *Comparison of collaboration among MIW, SEQ, Queensland and Australian firms*

[8] Howard, M., Steensma, H. K., Lyles, M. and Dhanaraj, C., 2016. Learning to collaborate through collaboration: How allying with expert firms influences collaborative innovation within novice firms. *Strategic Management Journal*, *37*(10), pp.2092-2103.

[9] Smirnova, M. M., Rebiazina, V.A. and Khomich, S.G., 2018. When does innovation collaboration pay off? The role of relational learning and the timing of collaboration. *Industrial Marketing Management*, *74*, pp. 126-137.

[10] Schilling, M. A., 2016. *Strategic management of technological innovation*. New York, NY: McGraw-Hill Education.

Both innovator and non-innovator MIW firms benefit from collaboration. The main benefits innovators experience who collaborate are to outsource aspects of their business (38.1%), develop management and staff development (33.5%), as well as developing specialist products or services required by customers (33.3%), while non-innovators collaborate and improve their financial and market credibility (78.3%), gain access to new markets (77.3%) and expand their product and service range to customers (72%). Compared to Queensland, Australian and SEQ firms, MIW non-innovators report higher levels of collaboration and benefits experienced from collaboration, as shown in Figure 22.

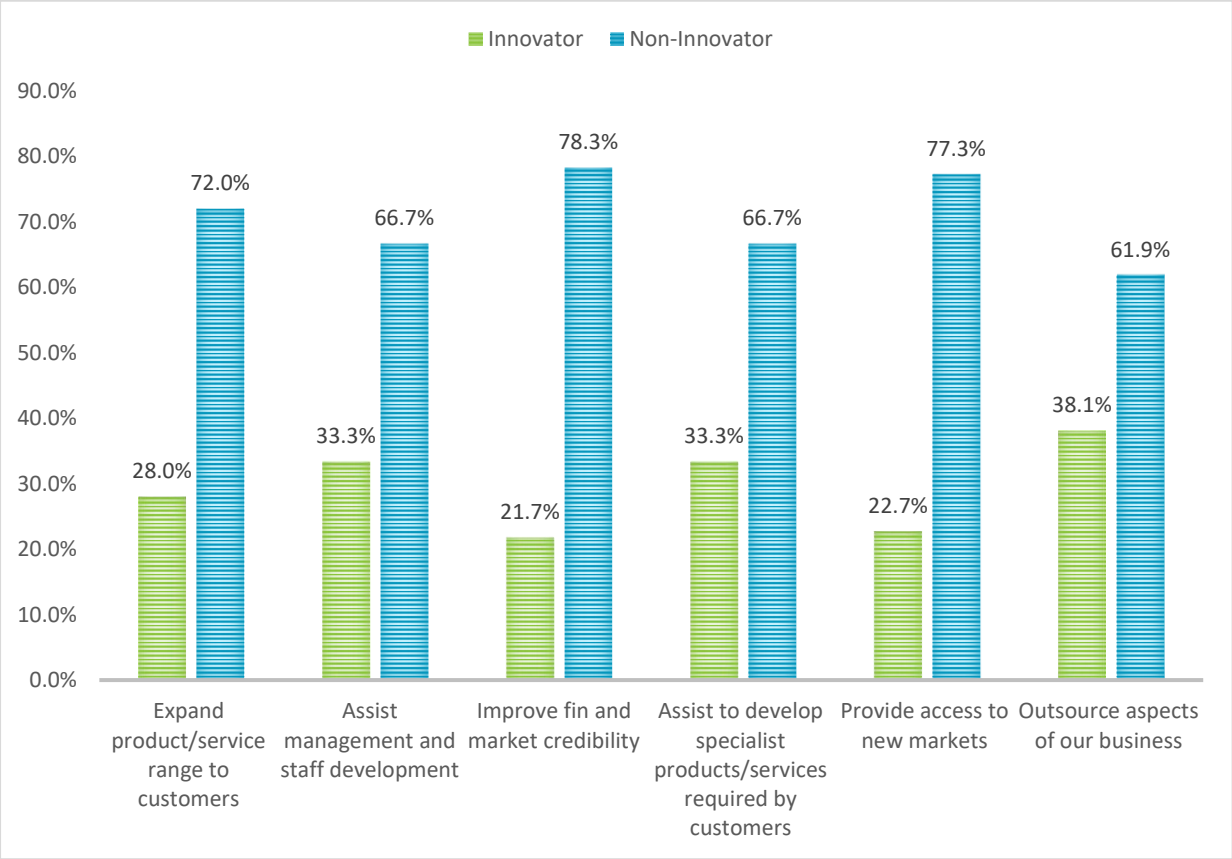



***Figure 22:*** *Comparison of collaboration benefits obtained among innovators*

# 7. Innovation outcomes and productivity

Firms' satisfaction with their achievement of performance outcomes were measured in terms of changes to sales from new products or services introduced, profit improvements, growth, productivity, and customer and market metrics.

Generally, innovators were more likely to prioritise profit measures, seek growth in assets and focus on improvements in labour and capital productivity. Similarly, increasing market share and a strong focus on customer satisfaction was critical to innovators.

## 7.1. Changes in sales from new products and services introduced

MIW firms tend to have a higher proportion of sales from new products or services introduced, similar to firms across the country. MIW innovators report cumulatively that more than 90% of sales increases are from the introduction of new products indicating they reap the benefits of their efforts.

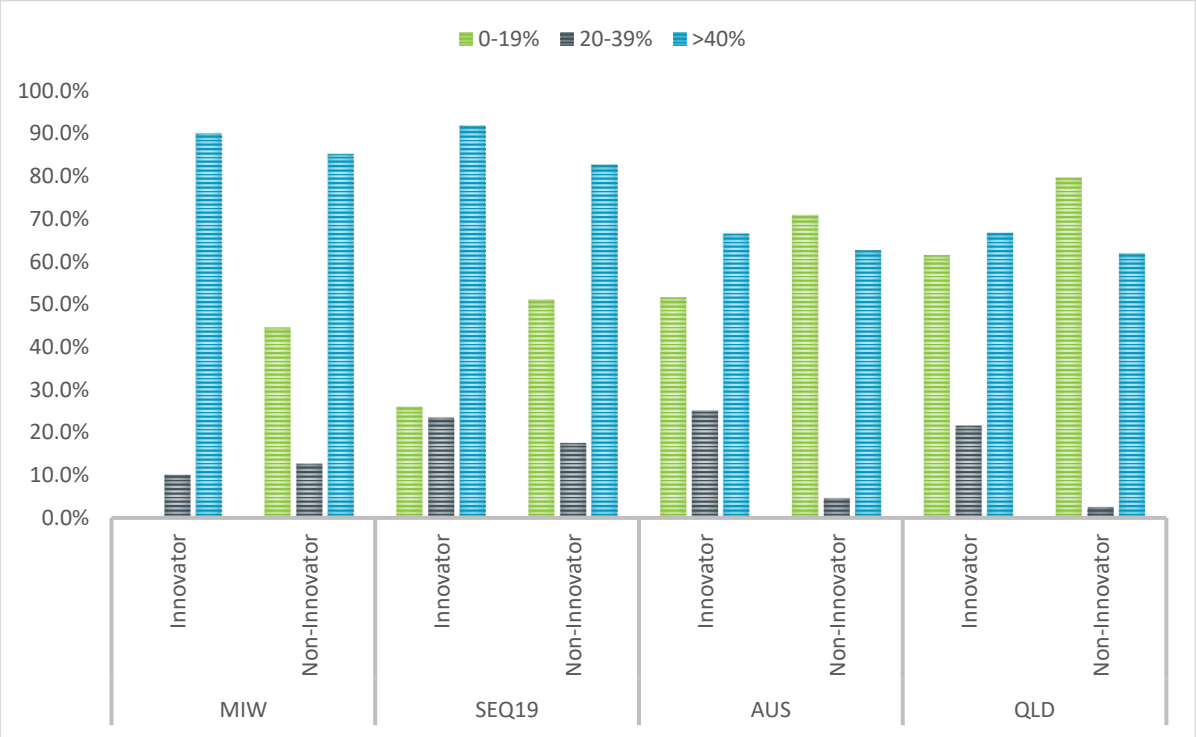



***Figure 23:*** *Comparison of percentage of sales from new products or services categories introduced benchmarked*

## 7.2. Profit performance indicators

The profit indicators compared were profit per employee, return on assets and profit margin on sales. Overall, MIW innovators in 2020 reported higher satisfaction with performance goal achievement than non-innovators, especially on return on sales in 2020.

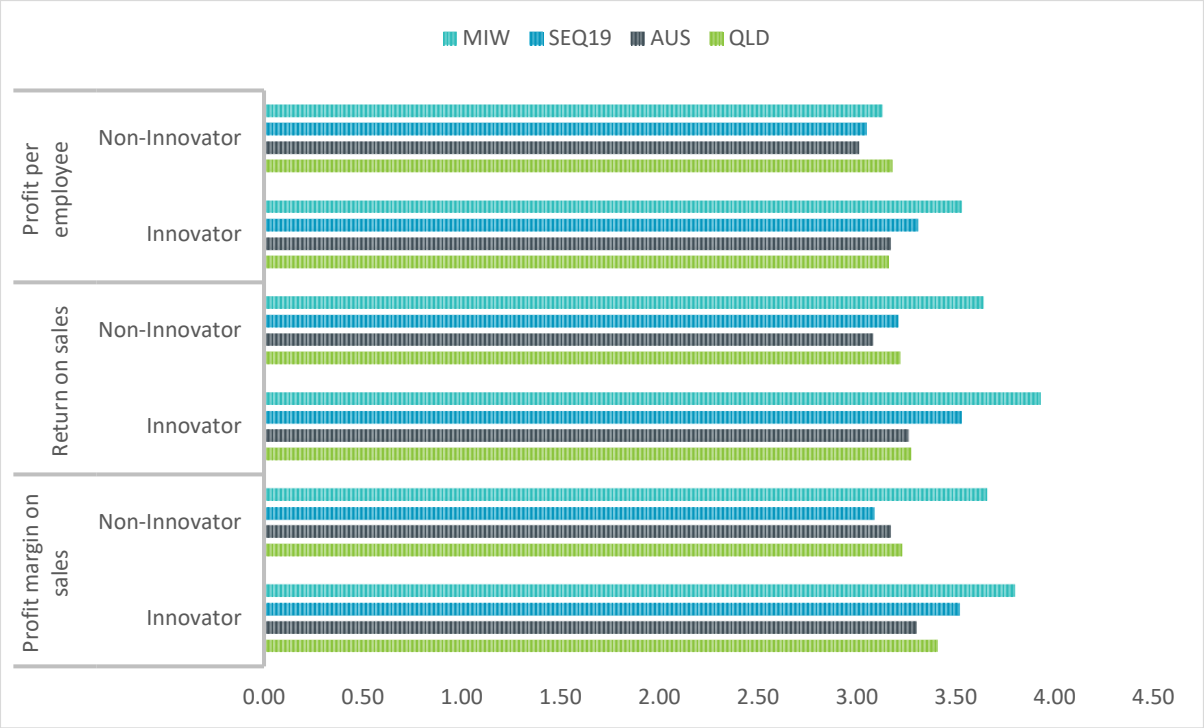



***Figure 24:*** *Comparison profit performance measures on 5-point scale*

## 7.3. Growth performance indicators

Growth in firms is often associated with innovation and entrepreneurial activities.[11] Growth in performance was measured by growth in profits, employees, assets and sales, which is common to the approach followed by leading scholars.[12] MIW innovators in 2020 reported high satisfaction with profit growth and growth in sales in 2020. Innovators tended to be more satisfied in achieving their growth performance goals than non-innovators when comparing growth in profits, growth in sales, and asset growth.

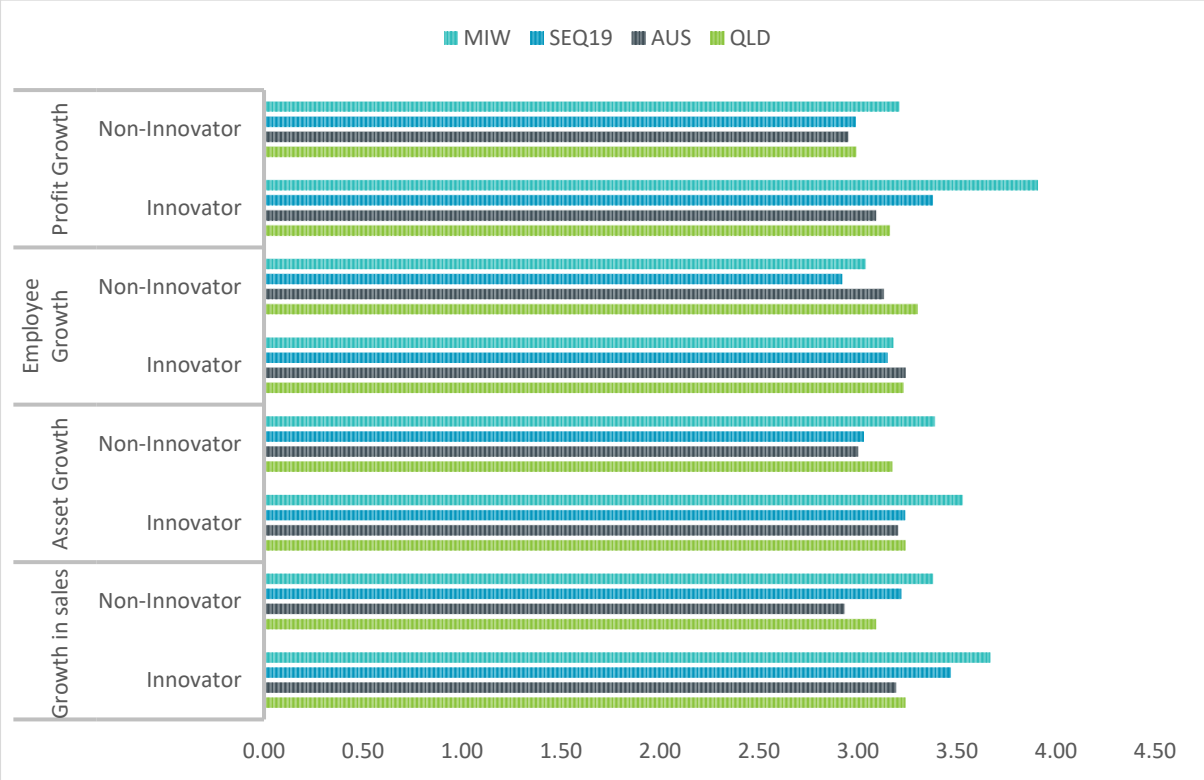



***Figure 25:*** *Comparison of growth metric goals on 5-point scale*

[11] Davidsson, P., Steffens, P. and Fitzsimmons, J., 2009. Growing profitable or growing from profits: putting the horse in front of the cart?. Journal of Business Venturing, 24(4), pp.388-406.

[12] Verreynne, M. L., Meyer, D. and Liesch, P., 2016. Beyond the formal–informal dichotomy of small firm strategy-making in stable and dynamic environments. Journal of Small Business Management, 54(2), pp.420-444.

## 7.4. Productivity performance indicators

Labour and capital productivity are considered societal benefits of innovation,[13] therefore measures related to satisfaction with labour and capital productivity and improvements in these areas were benchmarked.

Mackay Isaac Whitsunday innovators reported higher increases in improving labour productivity and capital productivity, compared to non-innovators.

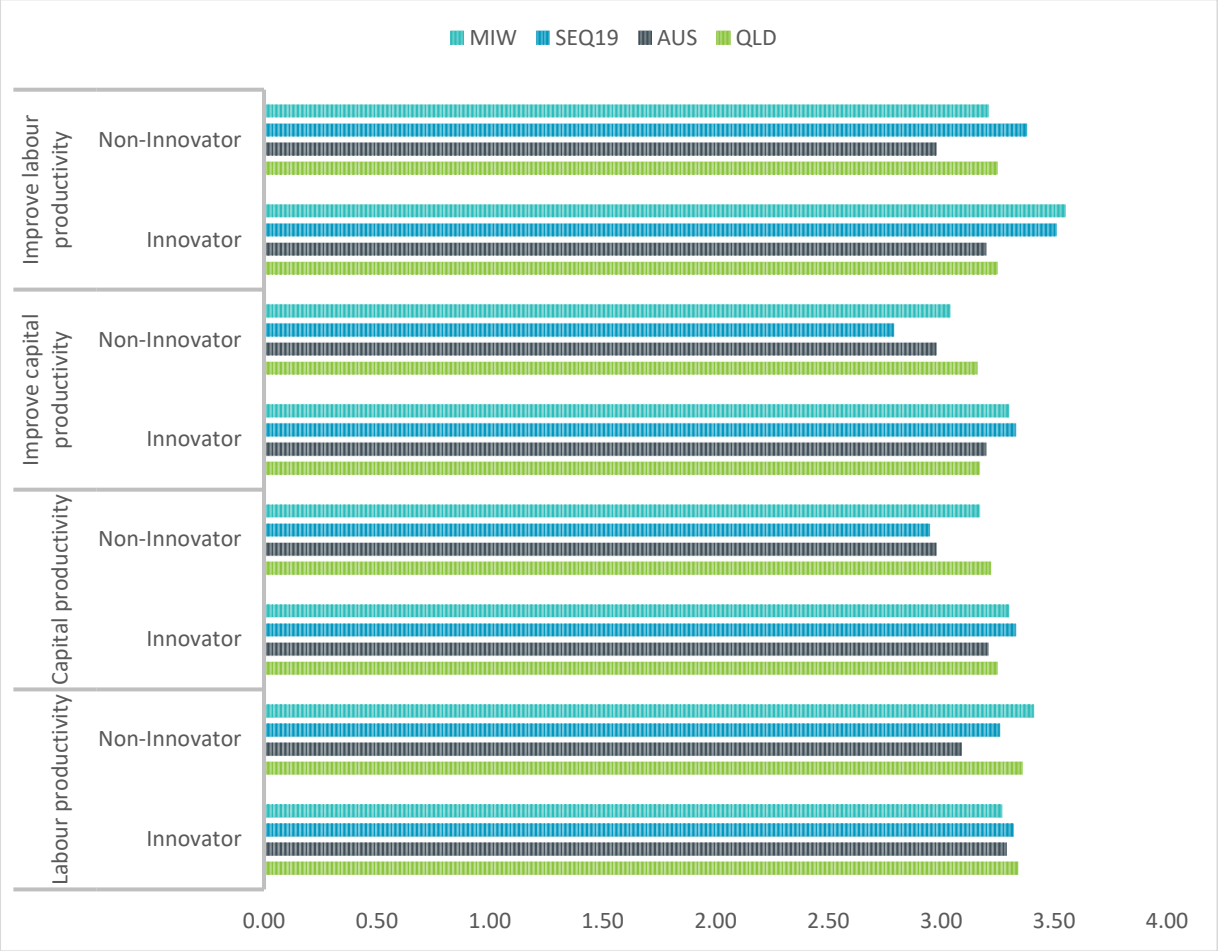



***Figure 26:*** *Comparison of productivity improvement goal achievement on 5-point scale*

[13] Ahlstrom, D., 2010. Innovation and growth: How business contributes to society. *Academy of management perspectives*, *24*(3), pp.11-24.

## 7.5. Customer performance indicators

All firms (both innovators and non-innovators) across Australia regarded maintaining and increasing customer satisfaction as critical and were satisfied with their performance on this metric. Increasing and maintaining market share was important, but Mackay Isaac Whitsunday innovators were most satisfied with increasing their market share in 2020.

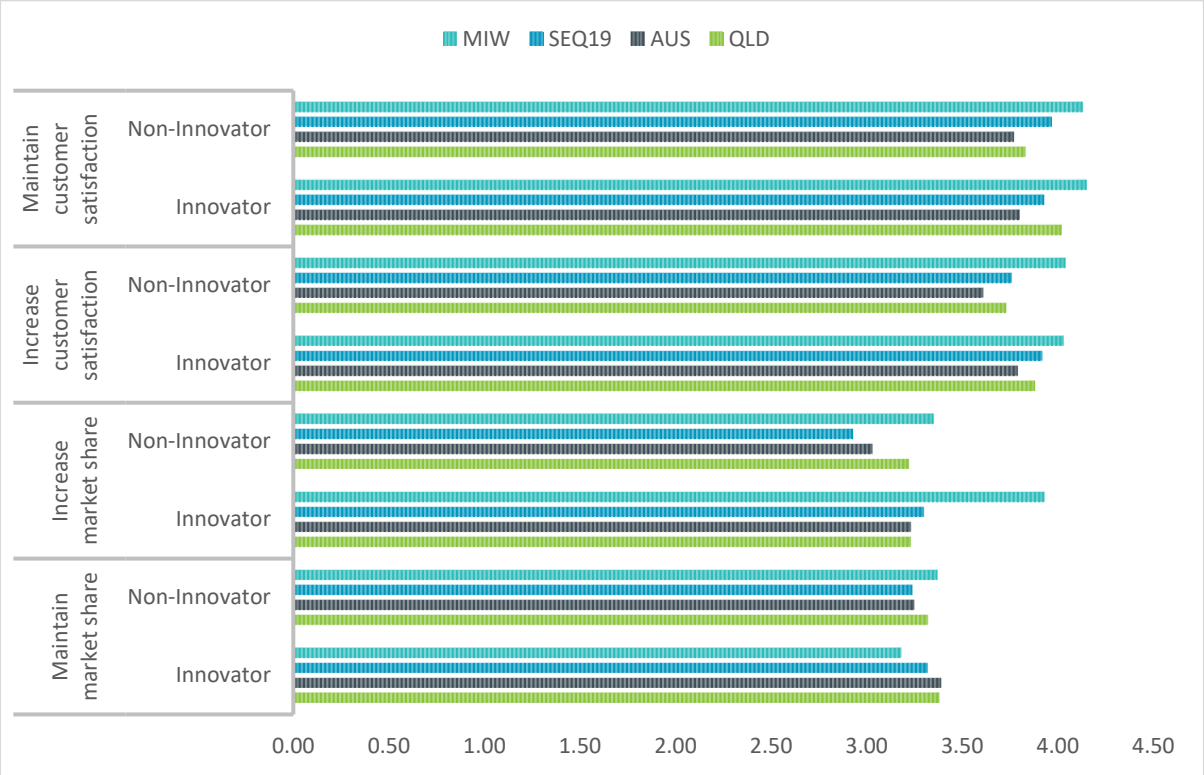



***Figure 27:*** *Comparison of market and customer metrics goal achievement on 5-point scale*

# 8. Business context and environment

## 8.1. Awareness and use of support

Various forms of business support are available to small firms, ranging from financial interventions or grants to business support interventions.[14] Business support includes business skill improvement, business opportunity development, benchmarking tools, mentoring, and self-help diagnostics.

Generally, only a small proportion of firms are aware of and access support provided, due to managerial capacity[15] and owner/manager time devoted to operating and managing firms of this nature. Overall, innovators are more likely to be aware of support offered, compared to non-innovators.

Specifically, MIW firms show high levels of awareness of support available, with innovators more likely to make use of the support available. The top three forms of support used by MIW innovators were grants (70%), mentoring (80%) and skill development (80%), while non-innovators top sources of support used were skill-development (51.7%), grants (40%) and mentoring (37.3%). Figure 30 compares MIW innovators awareness and use of support with innovators from other regions, and while differences are discernible, care should be taken when interpreting these results due to the small number of MIW innovators in the total sample.

[14] Mole, K., North, D. and Baldock, R., 2017. Which SMEs seek external support? Business characteristics, management behaviour and external influences in a contingency approach. *Environment and Planning C: Politics and Space, 35*(3), pp.476-499.

[15] Bloch, H. and Bhattacharya, M., 2016. Promotion of innovation and job growth in small-and medium-sized enterprises in Australia: Evidence and policy issues. *Australian Economic Review, 49*(2), pp.192-199.

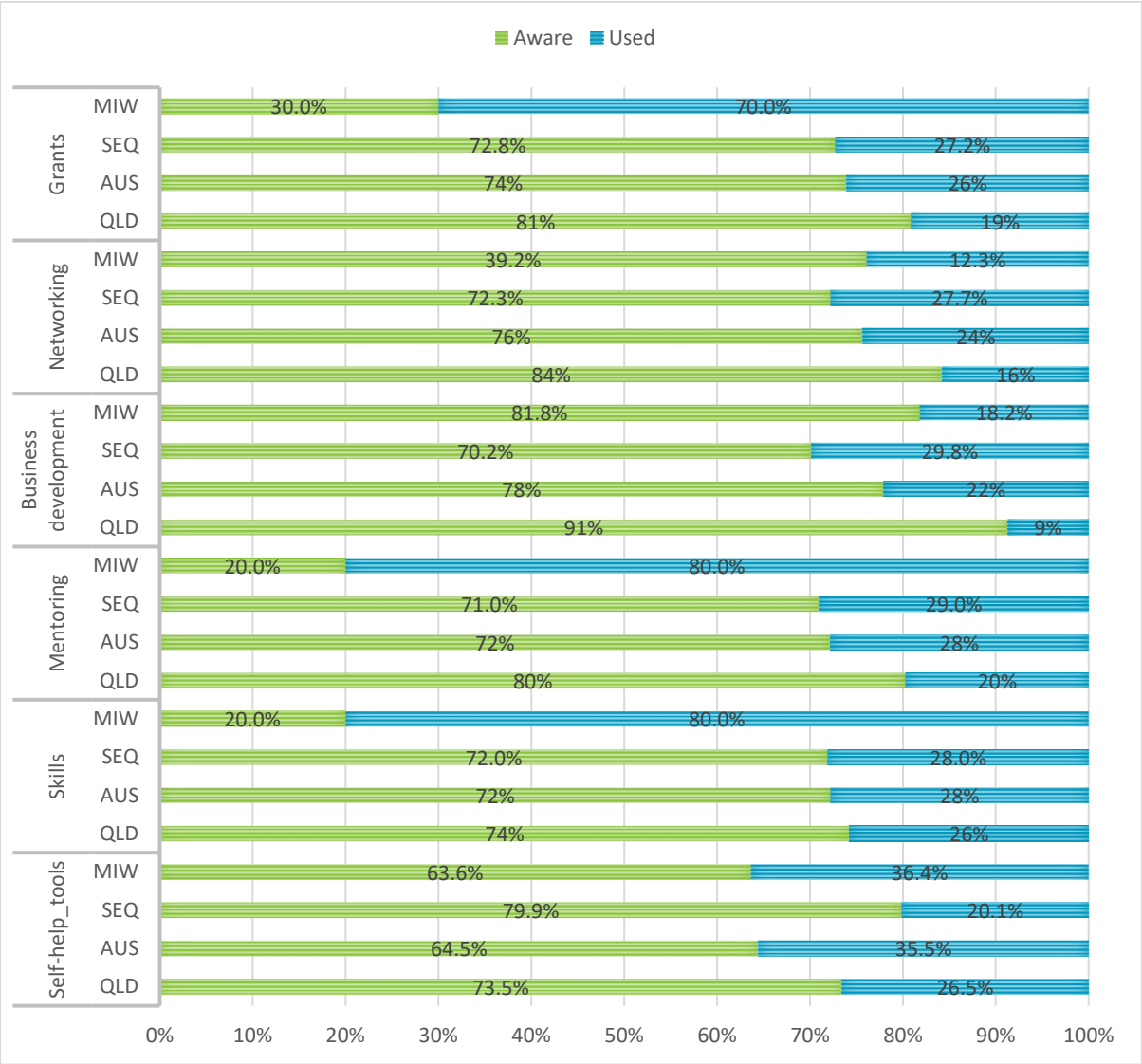



***Figure 28:*** *Comparison of innovators awareness and use of support.*

## 8.2. Accessing support

MIW firms were most likely to turn to their accountant, a specialist agency such as a marketing agency or legal practice, the internet, a mentor, or government sources. Similar to firms in other regions this shows that professional services firms such as accountants and specialist agencies such as marketing agencies, web design agencies or legal practices play an important role in providing professional support, broader than their specialisation, to their business clients. Especially during crises, such as the COVID-19 pandemic, many small firms sought business advice. As small firms are time poor, and a professional services firms have a trusted relationship with their clients, innovation support and other support programs and information can be passed along to small firms via these sources.

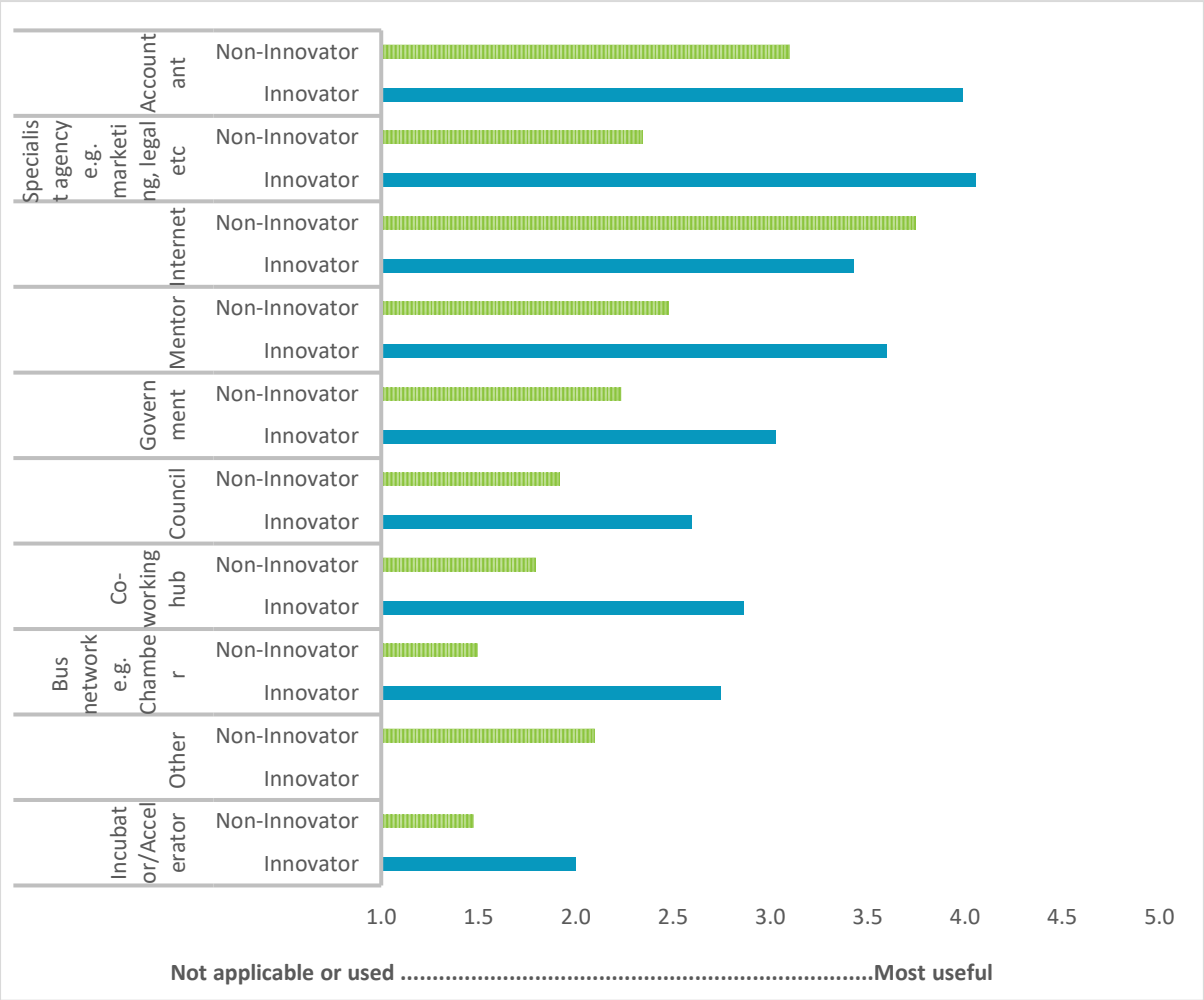



***Figure 29:*** *Ways in which Mackay Isaac Whitsunday firms access support in 2020*

These findings reveal that for MIW firms, the top ways of accessing support are from their accountant, a specialist agency such as a marketing agency or legal practice, the internet or through a mentor, followed by governmenat and Council sources.

# 9. Case studies

Five case studies in the MIW region reflect the entrepreneurial mindset of businesses in the Mining, Equipment, Technology and Service (METS) industries, tourism and the agribusiness industry.

The case studies reflect a spirit of continuous improvement and innovation and highlight how innovators have responded to the impact of the COVID-19 pandemic on their businesses.

*CSG Mining Equipment: Build a business model not an invention.*

CSG Mining Equipment identifies industry inefficiencies and designs products to solve them. Focused on continuous improvement, CSG created a valued product innovation in the MK3 air pump controller, enabling the founder to sell this part of the business. CSG's learning and knowledge was then leveraged for future innovations, applying a portfolio approach to entrepreneurship.

*Elysian Retreat: Innovation despite adversity*

Elysian Retreat exemplifies business resilience. Established in the aftermath of Cyclone Debbie, Elysian is an eco-friendly and sustainability focused resort that targets a niche market segment and utilises industry trends, pays careful attention to changing customer preferences and implements marketing innovation to create new value for their customers.

*Prochem: Cool to recycle*

Diversification is the key to Prochem's strategy. Collaboration with James Cook University enabled the development of an integrated process and product innovation that upcycles spent coolant into an eco-friendly truck wash, Coolwash, providing industry and environmental benefits.

*2PL Enterprises: New tech for old problems*

2PL Enterprises embraces new technologies to work smarter, not harder. Believing that innovation needs to solve real problems, 2PL's Single Shot spot drone illustrates that being open to change and adopting innovative technologies can improve productivity and business efficiency.

*EHS Manufacturing: Cool, complex continuous innovation*

EHS Manufacturing shows that small firms can be giants in their industries by adopting an entrepreneurial mindset. Analysing each step of the sugar cane harvesting led to the development of breakthrough innovative products, such as the Cane Stalker and MaxiChop, that provide industry-changing benefits and international export opportunities, highlighting the importance of intellectual property protection.

## CSG Mining Equipment: Build a business model, not an invention

CSG Mining Equipment provides machining, programming and maintenance solutions for fabricators and the mining industry. Craig Gunthorpe founded the Mackay-based startup in 2018, drawing on his technical background, computing knowledge, and extensive experience in the mining industry. Craig is a problem-solver by nature and his firsthand knowledge of working underground inspired him to develop a 'smart' pneumatic controller that retrofits the industry standard pump to improve dewatering capabilities.

"Working in a pit was like working on a sinking ship. If we lost electricity, we had to sandbag the tunnelling machines because water would slowly and continuously come up out of the floor, roof and walls." Craig describes shifts standing knee-deep in sludge, his only job scraping coal slurry off the pump's suction hoses, and thinking 'these pumps are pretty awful, we can do a lot better.' Although Craig's first attempt at a solution failed, he persevered, resulting in the MK2 air pump controller, an automated smart valve and airflow monitor. The MK2 monitors water flow, running the pump only when water is moving through the system, reducing air consumption, and electricity and maintenance costs.

The MK2 air pump controller improves the life of diaphragm pumps, effectively managing water levels underground. The MK2 was a finalist in the 2019 Innovative Mining Solution category for the Australian Mining Prospect Awards.

### COVID-19 impacts

The impact of COVID-19 was moderate for CSG Mining Equipment. While it didn't impact Craig's working practices too much, the imposed restrictions led to a general loss of business confidence. Many of CSG's clients took a cautious approach, reducing expenditure on new purchases. "It's hard to quantify the opportunity lost," says Craig, as many potential clients "tightened their budgets". During times of uncertainty, larger firms with sufficient resources are able to minimise risks by being cautious. However, for a startup like CSG which had begun to build a runway of sales, the general slowdown made it tough. Craig persevered and continued to improve the air pump controller.

### Response

In September 2020 CSG Mining Equipment launched the MK3 air pump controller. Extensive testing of the MK3 at a Queensland underground coal mine demonstrated a decrease in air consumption, with approximately 84% reduction in running time. The service life of existing diaphragm pumps improved from 60 days to 274 days, reducing the carbon footprint and with significant cost savings in maintenance and energy. The MK3 air pump controller was also easy to install and could be deployed quickly and function reliably under harsh environmental conditions underground.

Looking for new potential clients, Craig realised that despite the benefits of the MK3, many mine managers prefer to deal with fewer vendors. In response, Craig adapted his business goals, focusing on companies which offer a larger range of pumps, or manage water systems, as they could add his

air pump to their product range. This led to Craig negotiating with NQ Water, Pumping and Irrigation to sell the MK3 and its associated intellectual property.

When developing the MK2 and MK3 product range, Craig found the prototyping phase challenging and identified a gap in the market. Always a problem-solver, Craig is now developing mHub, an online manufacturing platform. Utilising his coding skills, Craig has designed a system that will automate workflows for manufacturing businesses, making dynamic, advanced technologies more accessible to fabricators, hobbyists and industrial customers.

Craig explains, "I ship all of my valves in plywood boxes. I used to draw those up on the computer and then send it to my cutter and mark the boxes out with the laser. So that takes 20 minutes or something". But I wrote a program and instead I just tell the program, how big I want the box to be, and it generates all the machine code that goes straight to the laser cutter." This automation allows instant costings for customers and from the manufacturer side "you just get an email with an order sheet and your machine code and you just go straight to the machine, plug it in and start cutting." Craig's program generates the design code based on the given parameters, which can be varied without any time costs for the manufacturer.

The M-Hub will complement the machining and programming services CSG provides, while the program itself can be adapted for a variety of software, manufacturing applications, and businesses.

## Future

Craig, as part of a four-person team, has applied for funding from the Australian Coal Industry's Research Program (ACARP) to develop a mine safety robot, named Hansel. The robot design focuses on reliability and ease of use, so it can be operated by mine electricians and function in the challenging mine environment when disasters occur.


*Hansel prototype (mock-up supplied C. Gunthorpe)*

## Lessons Learnt about resilience and innovation

- Build a business model rather than a product: While technical inventors and entrepreneurs may be good at building a superior product, all aspects of the business model should be considered such as why customers buy, how they make buying decisions, how value is delivered and how repeatable revenue is earned.
- Identify innovation opportunities by solving problems:

  George Bernard Shaw said: "The reasonable man adapts himself to the world: the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man," Craig's take on this is: "To be an inventor, you've got to be a bit of a whinger" – as he focuses his talents on solving problems through innovative technological solutions.

- Innovators don't have a perfect product, but they continue to iterate and improve, and the learning gained through the process often shows new opportunities.
- Reach out and find out what support is available: Communities like Split Spaces, Mackay, AusIndustry and experienced businesspeople can provide invaluable coaching, so not everything needs to be learnt through trial-and-error.

## Elysian Retreat: Innovation despite adversity

Launched by Laureth and Wayne Rumble in April 2019, Elysian Eco Retreat is a luxury resort on Long Island, in the Whitsundays. As the first solar powered resorts in the region, Elysian offers eco-friendly niche experiences, with a commitment to introducing sustainability innovations by minimising environmental impacts through waste reduction, improving water efficiency, off-setting 150% of carbon, and using only organic, earth-friendly products and locally sourced produce. Providing a uniquely personalised experience is at the forefront of Elysian's approach.

Elysian was born from adversity, created in the aftermath of Cyclone Debbie by Sojourn Retreats, a boutique collection of tourism properties in the Whitsunday and Southern Great Barrier Reef region, owned and operated by a Queensland family. Motivated by their love of island life and the natural environment, Sojourn Retreats offer guests the chance to disconnect from busy lives and reconnect with nature along the breathtaking Southern Great Barrier Reef and Whitsunday region.

Laureth, Wayne and Charlton Craggs grew up in the hospitality industry, with parents involved in boutique hotels, restaurants, and marinas. They honed their sustainability philosophy and management skills with 13 years' experience operating Pumpkin Island Eco Retreat, 14km from Yeppoon, which offers a range of self-catering accommodation options to families.

Elysian offers rejuvenating personalised experiences and wellness retreats to couples, honeymooners, babymooners, and return guests. "Our guests are often trend setters themselves, they are passionate about sustainability," says Laureth, "They prefer off the beaten track, unique experiences to big hotels or resorts." Laureth and her team's deep understanding of her guests' preferences, attention to detail, and artistic flair contribute to the guest experience.

Launched in April 2019, Elysian turned a profit by December. Bookings looked good for January 2020 and beyond until the severe bushfires, followed by the pandemic, led international and interstate guests to cancel their travel plans.

### COVID-19 impacts

The impact of COVID-19 on Elysian was severe. The Australian-wide lock-down in March 2020 resulted in the resort closing for four months. "It was a very stressful time; we didn't think we were going to survive. Elysian is a new business. We had a lot of expenses, staff depending on us and the immense cost of renovations to pay, with no income," recalls Laureth.

At the time with no support available and JobKeeper only extended to permanent employees or Australian citizens, they had to let close to 90% of their staff go. "It was absolutely heartbreaking, as many were casuals and our two managers were on skilled sponsored visas, which meant they didn't qualify." While expenses kept mounting, they found little empathy from the bank, or Council regarding rates and taxes.

Although relaxed restrictions in the second part of 2020 allowed Queenslanders to travel within the state, this had little effect on Elysian's fortunes, as 60% of their market are interstate travellers and the rest international tourists. The on-and-off state border closures in 2020 and snap lockdowns over

the Christmas-New year period and Easter 2021, wreaked havoc with bookings and staff. Elysian Retreat, together with other Whitsundays' tourism operators, presented their concerns to the State Government, with little effect. "We had no choice, we just had to cope, and it ate into our reserves," says Laureth.

During this time Laureth connected with Natassia Wheeler, CEO Tourism Whitsundays, and became aware of the help available through the Greater Whitsunday Alliance (GW3).

## Response

Greater Whitsunday Alliance (GW3) offered support to regional businesses in the middle of 2020, enabling them to connect with a business service of their choice. Elysian grabbed the opportunity and concentrated on their social media marketing, working with Birdcage Marketing's Madeline Avery and Tenai Seymour. Through training and personalised mentoring, Elysian revised their social media strategy and more than tripled the return on investment. "Before it was really challenging to work out how to target our ideal customer, but Tenai helped and I started to learn more about lookalike audiences on Facebook and how to use it," Laureth says. "It was incredible to see the difference after we ran the campaign. The traffic to our website increased. We saw a high conversion and click through rate. It made a big difference."

The social media strategy and mentoring helped Elysian grow their domestic, but specifically intrastate market. The precise targeting improved their response to snap lockdowns, enabling them to turn off the campaign to a specific state when borders closed. While the recovery is ongoing, Laureth and Wayne continue to seek out opportunities.

## Future

Laureth and Wayne's continuous innovation to improve guests' experiences, fulfil sustainability ambitions, and improve marketing and business processes is part of their DNA. They find opportunities by following their intuition, listening to customers, and keeping abreast of industry trends. "We're always bringing in new services, as we often have return guests, for example I'm looking at a new infrared sauna, introducing sound healing after yoga classes and we're also starting boat charters."

Their newest service, Keppel Charters, offers boat charter services for Pumpkin Island guests, offering tailored experiences for families and couples, including day trips, proposals, elopements, weddings, special celebrations and anniversaries. This ongoing commitment to innovation has brought resilience in extreme adversity.

## Lessons Learnt about resilience and innovation

- Identify opportunities by attending to customer preferences: Customers are one of the greatest sources of ideas; when really listening to them, it's possible to find out where to offer value based on their changing preferences.
- Keep abreast of industry trends: Industry bodies circulate newsletters detailing local and international research studies and. Being able to move fast and seize these opportunities, you can keep ahead of competitors.

- Learn new skills: Use the time when business is slower (or during pandemic shutdowns) to learn new skills, such as digital marketing. The importance of doing business digitally will only increase in the future.
- Keep in touch with local organisations that provide business support: Joining an industry body, local business network, and connecting with regional economic development agencies, is a great way to stay aware of business support, grants and other opportunities that arise.

## Prochem: Cool to recycle

Prochem Group of Companies is a family-owned business that provides a range of services to the industrial and resource sector in North Queensland. John Colvin, Director, started as Manager of the Mackay-based business more than 20 years ago taking over sole ownership 10 years ago with a proactive approach, always looking for growth opportunities. Beginning with lubrication systems and haulage, Prochem later expanded to include environmental services such as water treatment, recycling, waste disposal and bioremediation.

Over the years, Prochem has continued to embrace entrepreneurial opportunities. John's sons trade experience enabled Prochem to expand into mechanical repairs, auto electrical and hydraulic services, Fleet maintenance, warehousing and distribution, as well as a wide range of environmental services.

This commitment to sustainability and environmental management led John to apply for Innovation Connections grants from the Department of Industry, in collaboration with Professor Peter Junk and his team from James Cook University (JCU).

### New product development

Utilising their experience in environmental management services Prochem concentrates on developing products and processes that reclaim and recycle spent waste streams into sustainable resources. Experienced with mining procedures, John knew corrosion is a significant problem onsite, as vehicles and equipment operate in harsh, damp conditions, requiring frequent washing. The residue of existing truck washes, coal and hard raw water accelerate corrosion, with metal surfaces, such as chassis rails, tyre rims and under cabs the hardest hit.

John and his team started working on a new truck wash to address some of these problems and obtained surprisingly positive results. To quantify benefits, improve processes and ensure the product had scientific evidence to back up claims, they joined forces with JCU resulting in product and process innovations.

The product is Coolwash, a recycled, biodegradable, cleaning detergent that provides protection against corrosion. Coolwash is safe on metal surfaces, chrome or paintwork, meets ADF Code, and can be diluted and used in automated truck and vehicle Light Vehicle cleaning system, increasing the lifespan of plant and equipment. "It's great as we've developed a good working relationship with JCU and now have a safe product that's scientifically tested right out of regional Queensland," says John. Testing various dilutions of truck wash with different ph water levels, the JCU team refined the most efficient combination of Coolwash and water type that delivers the least corrosion.

The process innovation enables a more efficient and environmentally friendly reclamation and reuse system with 85-90% of the onsite wastewater recovered. The problem waste stream can now be recycled into Coolwash and when combined with Prochem's fully automated tamper proof dilution system, significantly reduces infrastructure costs and contaminant levels entering treatment systems.

## COVID-19 impacts

The impact of COVID-19 on Prochem was less severe than for other businesses, however there were challenges. Social distancing requirements necessitated changes to how work was organised resulting in two shifts, while global supply chain disruptions meant delayed delivery of many components and equipment. Over the longer-term skill and labour shortages also impacted the business.

## Response

When restrictions were first announced John and his team assessed the likely impact on employees and finances. The first challenge they faced was to reallocate work for those over 55, considered vulnerable based on the health directives. Some employees working on mine sites were re-allocated to Prochem's premises in the workshop, warehousing and components. Second, they divided the workspace, deploying administration staff to different buildings and splitting the mechanical workshop into two shifts, a day and night shift. This resulted in increased demand for night shift was services, as customers could bring in vehicles in the afternoon and have it ready the next day, improving customers' productivity. "It's actually been a benefit out of COVID that we will continue to run with," says John.

Prochem also has a strong commitment to developing skills in their sector and actively train and mentor employees. Engaging experienced workers over 65 to mentor apprentices, Prochem ensures skills and wisdom is passed on to the next generation, while increasing staff wellbeing.

Over the past year Prochem and JCU continued the product development and research work, resulting in Coolwash, which is now ready to launch into the market. Thus, using the time during which restrictions were imposed to continue with research and development.

## Future

One of the main challenges for Prochem is to remain agile, because despite employing more than 60 people, they are still small compared to large multi-nationals with access to global intelligence and R&D labs.

Prochem is ready to roll-out Coolwash, focusing on growing their customer base in this area and ramping up production in Mackay, to keep jobs local. John is continuously on the lookout for opportunities to grow the business, capitalising on industry trends, "There is a strong push globally towards sustainable resource use," he says.

They manage their costs carefully, ensure the business is diversified and seek out new opportunities, while constantly learning about new technologies and trends likely to impact the customers and industries Prochem works with.

## Lessons Learnt about resilience and innovation

- Involve employees in the innovation process: By building a strong organisational culture where everyone operates as a team, employees feel valued, speak-up and bring in new ideas

that management might not be aware of. The diverse perspectives help to surface new ideas and improvements.

- Careful cost and cash management is critical during tough times like the pandemic. Being aware of daily running costs, cash in and outflows, means a business knows what they can and can't do and how to survive tough times.
- Manage growth carefully: While some opportunities that arise may be attractive, it's important to manage growth in a way that doesn't overextend the business.
- Sustainability trends provide the opportunity for businesses in future to engage in the circular economy. Businesses can find opportunities in energy efficiencies and exploring ways to recycle and upcycle waste.

## 2PL Enterprises: new tech for old problems

2PL Enterprises is a Clermont-based agricultural family business, founded by Pat and Prue Lonergan. They provide weed management services and are involved in beef production. Pat's heart has always been in agriculture, due to his family background. After completing his trade qualification and working in mining for several years, Pat chose to return to the land. His partner Prue, has a small business background and is trained in management and aviation, so the team are proactive and constantly on the lookout for "how to do more with limited resources."

Pat and Prue established 2PL in 2008 and serve local farmers, contract spraying more than 35,000ha p.a. They also realised their dream of getting into beef production by buying a cattle operation in 2012 and expanding in 2018.

Looking to improve productivity and efficiency in herbicide spraying, 2PL researched different spot spraying options. Unhappy with what was available, they put the expansion on hold, until 18 months ago when Pat found Single Shot, a custom-built sensor capable of detecting and mapping weeds.

Single Shot provides an accurate digital map of weed location, so compatible boom spray rigs can become low-cost spot sprayers. Single Shot, developed by Tony and John Single, is a camera gimble-mounted to a 1.8m diameter drone aligned with a GPS system that detects weeds as small as 1cm x 1cm from a height of 75m. The drone covers approximately 250ha an hour, taking images that are processed for weed detection and can be adjusted for size sensitivity. "If you're already searching for large weeds, you can change the sensitivity so that you eliminate some of the smallest stuff, which you could do a blanket spray for, and then target the larger weed. So, it gives you a lot of options" explains Prue.

Prue and Pat trialled the Single Shot option in their local market. Prue explains that it required a bit of a paradigm shift to see drones as a useful tool, and get farmers and agronomists on board, "We've taken them on that journey with us, because they now understand what's possible with this technology."

2PL Enterprises offers the service to existing customers and can also provide digital maps to farmers with compatible spray rigs. Farmers receive the spray file on a USB, which contains the collated data. This enables farmers to tailor their weed management by targeting problem weeds, reducing chemical use and providing greater herbicide efficiency.

### COVID-19 impacts

The main impacts of COVID-19 on 2PL came from border closures and disruptions in supply chains. After signing up to the Single Shot system, Prue and Pat's plans were delayed by travel restrictions. The training and licensing required to fly the drones and use the specialised software was supposed to take 10 days but spiraled into almost 3 months, as they couldn't travel to NSW and had to resort to online training. While they managed to finalise the handover when borders reopened, Prue describes the process as 'a bit tricky' when learning to integrate a new technology into the business and when needing "to talk to someone, we couldn't cross the border. So, that was all really hard."

Travel restrictions also impacted their workforce, with cattle properties located 25 - 65km from Clermont, and clients spread over a 250km area, servicing customers, and managing stock was challenging. Importing parts, such as silicon chips required for the GPS, remains an ongoing problem, with delays of up to 6 months for replacements.

### Response

Like many cattle producers during the COVID-19 shutdown, 2PL adapted to the digital shift. With the closure of local saleyards countrywide, online cattle auction sites like Auctionplus.com.au took off, enabling breeders to keep selling stock and replenish herds lost to flooding and drought. While digital tools have helped mitigate some problems, Prue highlights the limitations for regional Queensland, "the whole concept that you can just jump on and do whatever you want, when you want, well … you can't when the speed is so slow, or you actually don't have access". As most applications require Cloud access to work effectively, lack of mobile network coverage on remote sites, where blackout spots can cover a 200km radius, is a real problem.

### Future

2PL are always looking for ways to innovate and improve productivity. Early adoption of new technology is part of their business philosophy. To improve time management for the cattle properties, they use innovative technology that limits the need to visit sites in person. "We monitor our water through different apps. We have automatic rain gauges, automatic tank sensors, and also can take a photo every number of hours so that we can actually see everything is okay." Another app, Maia, tracks herd numbers, movement and paddock yield, enabling accurate assessment of when a herd needs moving, and grass remaining in the paddock.

They are also trialling a GPS ear tag program that improves monitoring of their herds. The tag reads location every 20 minutes, which assists in monitoring health, activity, and improves mustering times in difficult locations.

While introducing a new service was challenging due to COVID-19, 2PL's drone for spot spraying is up and running. Their focus now is to grow the client base for their services.

### Lessons Learnt about resilience and innovation

- Innovations need to solve real problems to have value: In agriculture farmers are extremely practical and technology that delivers results are quickly adopted.
- Innovations can bring big productivity improvements: Technological and other innovations that save time and helps businesspeople to do more, make a big difference to small business owners.
- Make the most of networking opportunities and local resources: Trade events like Country Shows and GW3 small business month provide opportunities to share ideas and find out what others are doing. Organisations like NQ Dry Tropics, and the Department of Agriculture and Fisheries (DAF) are very helpful for agribusinesses.

## EHS Manufacturing: Cool, complex, continuous innovation

EHS Manufacturing offers innovative engineering, precision machining and fabrication to agriculture, mining and industrial clients. Steve Lawn, Managing Director, bought EHS Manufacturing in 2003 from Eddie Hugh Sims, an innovative farmer. Steve has implemented automated systems, upgraded EHS's capabilities in CNC machining, fabrication and design, and registered patents on several products. He still maintains the closeness to the agricultural community, continuing Eddie's legacy.

EHS Manufacturing employs a team of 16 staff and have developed a culture of design and manufacturing excellence. "We've got products that people have been surprised by. They think it is made in Germany, but it's made in Mackay. It's just an attitude towards how cool, complex and functional you can make something," explains Steve. EHS serves the agricultural industry and is also a Tier 1 supplier to international mining companies such as BMA, Rio Tinto and Anglo.

Staff at EHS do specialised work and are involved with the whole manufacturing process from the design, fabrication, machining, assembling and testing. This inclusive culture means there's a very low staff turnover. "Even when staff leave, we have a high percentage of them coming back," says Steve.

EHS has cultivated a reputation for innovative design. In the agricultural industry their approach to problem-solving and adapting equipment contributes to making the Australian sugar industry leaders in harvesting technology and best practice. EHS offers several innovative products to the sugarcane industry, which has earnt them an international reputation.

The EHS CaneStalker is a patented sugar cane harvester crop divider. Conventional harvesters result in some sugar crop losses during harvesting, as heavy cane crops can lodge, i.e. bend over and be close to the ground, making them difficult to harvest, thereby reducing the yield. EHS studied the whole harvesting process, identifying improvements that could be made to each stage. The CaneStalker was field tested in consultation with Sugar Research Australia. Steve explains that the Canestalker "First lifts, then sorts" the crop, adjusting the approach and sorting angles, and keeps the ground speed to 6km/hr for efficient harvesting, compared to the conventional 4km/hr for lodged crops. The CaneStalker's innovative design dramatically increases sugarcane famer's yields, reduces harvesting time and increases overall profitability.

EHS has a range of innovative agricultural equipment such as the MaxiChop, Side Shift Crop Divider, Sugarcane Transport Equipment, and other modifications that improve the competitiveness of sugar growers. EHS has strong relationships with Australian sugarcane producers and has exported their equipment to 12 countries.

### COVID-19 impacts

In 2020 the COVID-19 impacts on EHS were minimal. The company implemented COVID-safe practices and made operational changes as site visits were not always possible. Demand from their local customers was strong. However, as the pandemic spread worldwide, international demand for their agricultural equipment has quietened down. Developing countries have been particularly hard hit by the pandemic as health systems are under pressure and economies have slowed down. "We export

to several countries in Central America and Africa, but many of them are struggling at the moment and sometimes we just don't hear back from them" explains Steve.

## Response

EHS is growth orientated and seeks out opportunities to expand and innovate. Being a diversified business means they're able to safeguard against adverse market cycles and can leverage their skills and solutions from one industry to another. For example, hydraulic solutions for the agricultural industry can also solve problems in other industries.

Due to COVID-19 restrictions EHS aren't able to see local customers as regularly as they used to and have had less contact with international customers, so things are comparatively quiet. "We're using this time build stock of the products we want to sell," says Steve.

As EHS's focus is on world-class innovations, they keep abreast of industry changes globally. They also stay close to their major customers in the sugarcane and mining industries by developing a deep understanding of problems and then proposing solutions. For example, Steve explains that in the sugarcane industry many conventional manufacturers will try to incrementally improve the product, while EHS attempts to get rid of the problem completely. So, by thinking about a problem like crop losses in sugarcane differently to others, they are able to offer unique solutions and 'cool' designs.

## Future

Looking towards the future EHS plan to keep their leading position in the sugar industry and continue to innovate. Like other innovators, Steve and his team are balancing exploring new opportunities through innovations, with exploiting the value of their current products. "It's tricky as I easily get bored and I'm ready to move onto the next, new project, but we need to manufacture more of what we already do and send it out to the rest of the industry."

A strong intellectual property strategy underpins EHS's approach. In 2016 EHS registered their first patent, with others soon following. While patenting can be expensive, as they need to register patents in multiple countries, Steve explains that it was a necessity because "if we didn't do it, someone else would have copied us already." The investment made in these patents means EHS are committed to realising the return on that investment. It has offered them advantages such as enhancing the value of the business and signalling credibility in export markets. They have also trademarked the names of their products and invested in branding to ensure product recognition and protection.

## Lessons Learnt about resilience and innovation

- When seeking to innovate, study the whole process and identify all the areas where improvements can be made: EHS was able to offer significant benefits to sugar producers, as their CaneStalker has improved each step in the harvesting process, clearly differentiating their products from competitors.
- Intellectual property protection strategy: Intellectual property protection such as branding, trademark registration and patenting offers reputational advantages and enhances the value of the business and in international, competitive markets patenting might be essential.

- Diversification: Developing diversified revenue drivers makes a business less vulnerable to market fluctuations.
- Leverage skills to solve problems: Be careful to not get tied to one industry, instead focus on your businesses' capabilities and explore what problems these capabilities can solve. While industries are different, some problems are the same across industries.

# 10. Ecosystem resilience assessment

A thriving innovation ecosystem supports innovation and entrepreneurial activity with shared leadership between multiple stakeholders in the private, public and education sector. External shocks and crises like natural disasters and the COVID-19 pandemic underlines the importance of ecosystem resilience. This section outlines how the innovation ecosystem contributes to community resilience in the MIW region.

## 10.1. Scope and approach of the assessment

The community resilience assessment considered the extent to which the innovation ecosystem contributes to community resilience as considered by local experts[16]. Twelve organisational roles were targeted within six Queensland regions to assess the economic, social, and institutional dimensions of ecosystem resilience. This assessment relied on an 85-member expert survey of individuals across Queensland, including nine individuals from the MIW region, who fulfill critical roles with the regional innovation ecosystem and who independently evaluated their own role and the role of others in the region.

The 12 roles identified as both participating in the innovation ecosystem and contributing towards community resilience are depicted in Figure 30.

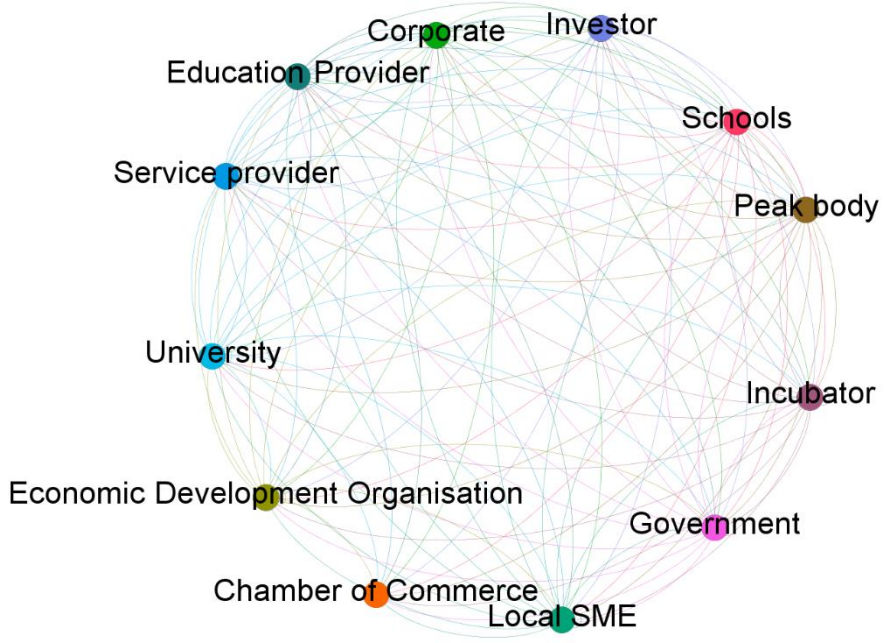



***Figure 30:*** *Twelve ecosystem organisational roles*

[16] Maestas, C., 2018. Expert Surveys as a Measurement Tool: Challenges and New Frontiers. In: L. R. Atkeson and R. M. Alvarez (Eds.), The Oxford Handbook of Polling and Survey Methods. Oxford University Press.

The experts were asked to evaluate their own role and eleven other roles' contribution to indicators of community resilience economic, social, and institutional dimensions, as shown in Table 1. The indicators were selected based on the likelihood of the innovation ecosystem to contribute to these indicators and the suitability for assessment through the experts.

***Table 1:*** *Dimensions and indicators of ecosystem resilience based on organisational roles within an ecosystem.*

| DIMENSION | INDICATOR | EXPLANATION |
|---|---|---|
| **Economic** | Entrepreneur support | The extent to which the role provides direct support for innovation-driven entrepreneurship in the region |
| **Social** | Trust | The extent to which a role is perceived as trustworthy, in terms of meeting expectations, not misusing power for private benefit and fulfilling promises. |
| | Diversity | The extent to which a role actively supports diverse community groups and minorities to engage in innovation-driven entrepreneurship |
| **Institutional** | COVID-19 (response) | The extent to which roles supported local businesses to adapt. |
| | Advocacy | The extent to which the role raises awareness, promotes and generates support for entrepreneurship |
| | Connections (internal) | Actively connect different groups within the local community. |
| | Connections (external) | Actively connects to networks outside the region. |
| | Collaboration (internal) | Actively facilitate collaboration (working together for a common cause) within the local community. |
| | Collaboration (external) | Actively facilitates collaboration with networks outside the region. |

## Organisational roles: A 360-degree assessment

Each expert rated their own role and 11 other roles in "the community in which they worked the majority of their time" for each of the nine indicators for a total of 108 ratings. On average, each indicator and role were provided with 63 ratings by the experts. The experts provided a total of 7,491 ratings against roles and indicators, similar to 360-degree assessments used in the human resource field.

The method and results were informed by and assessed against prior research comprised of a manual qualitative research performed through 187 manual interviews of similar roles across 15 regions in

Queensland in 2018[17]. The prior research validated the indicators and roles through a bottom-up grounded research approach, combined with an in-depth literature review and extensive mapping and observation of over 4,000 actors in the Australian innovation ecosystem. The current research extends and confirms the prior qualitative work.

## 10.2 Key expert sample

The sample consisted of 85 expert responses, from six Queensland regions, of which 9 were from the MIW region. Respondents were 55% male and 45% female. Regarding educational background 14% of respondents held a Doctorate or other post-graduate degree, 28% held a Masters, 36% held a Bachelors, and 19% held a diploma or certificate. The majority were employed full-time (62%), while 23% were self-employed, 5% were employed part-time, and 3% were contractors. The majority of respondents (42%) had been in their role five years or less, 21% for six to ten years, and 10% for over 25 years.

Respondents self-identified the organisational roles they fulfill within the region. The majority of respondents identified with government and service provider roles. Few respondents identified as an investor, chamber of commerce and representing a university and research institute.

In this study respondents were asked to identify with one primary role. Yet individuals in regional ecosystems often fill multiple roles for example when a peak body representative also serves as the coordinator of a local angel investment group or an individual in a government role also works at the local incubator.

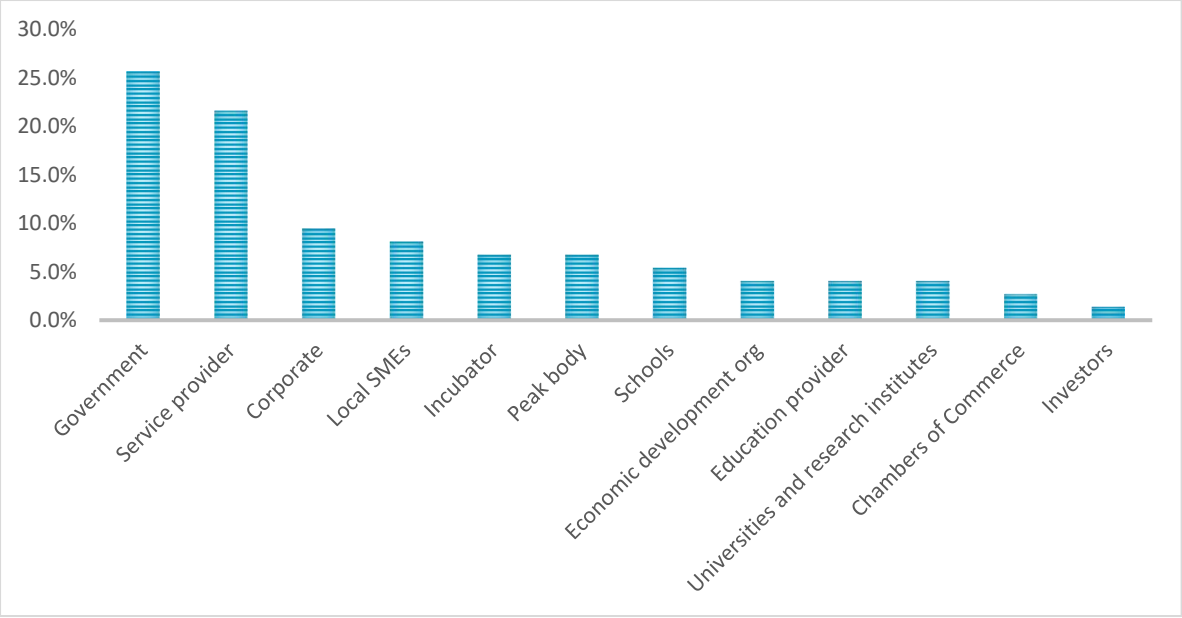



***Figure 31:*** *Primary roles of respondents*

[17] Renando, C. 2021. *The role of the innovation hub in contributing to community resilience*, Unpublished doctoral dissertation, University of Southern Queensland, Queensland, Australia

As the ecosystem resilience assessment focused on community role perceptions of the ecosystem, we used ratings of how organisational roles are perceived by 'others,' rather than self-assessment in determining regional ecosystem resilience on the economic, social and institutional dimensions.

The findings provide an assessment of how all roles are perceived by all roles. Given the size of the expert respondents (85), the number of roles (12), and the number of regions (6), results are not provided for ratings of specific roles for other roles in a specific region (e.g., how government views incubators or how investors view government). There are also a limited number of individuals acting in roles in a given region, which increases the likelihood of results providing identifiable information, which represents an ethical risk to participants in this study.

## 10.3 Overall Assessment: Community resilience of innovation ecosystems

The community resilience was assessed for six Queensland innovation ecosystems on indicators for economic, social and institutional dimensions. Findings are shown in Table 2. Respondents were asked to rate each role on the indictors of community resilience on a 5-point scale of low to high. Perceptions of roles' ratings are colour coded based on the relative rating against other roles for each indicator (see Figure 32 and Table 2).

- Green indicates perceptions of organisational roles that that were rated higher, for example economic development organisations are highly rated with regards to trust.
- Yellow shows moderate perceptions of a role, for example the economic support service providers deliver to support innovation-driven entrepreneurship is perceived as moderate.
- Red denotes low ratings, for example schools are rated low for advocacy for innovation-driven entrepreneurship.

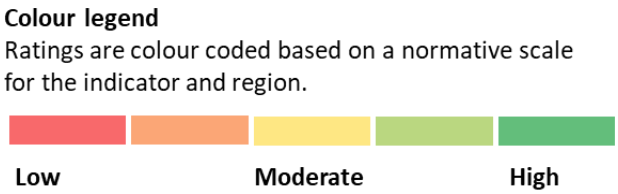



***Figure 32:*** *Colour Legend for organisational roles*

Ratings are categorised as "high" and "low". These ratings do not translate into a value-based assessment of "good" or "bad". When interpreting the ratings, the following caveats need to be considered:

1. Legitimate function: consider whether a role has a legitimate function for the indicator in the region, for example investors might be rated low on their COVID-19 response within a community, but that is not their legitimate function.
2. Role capacity: reflects how a particular role is resourced and how this influences that role's capacity to perform that function. For example, an incubator may be rated low for entrepreneurial advocacy, which might be seen as a function of incubators, but the role might not be adequately resourced to perform that function.

3. Role capability: ratings may also reflect the capability of the role to perform the function. For example, local schools may have intent to support entrepreneurial activity but may lack local capability to deliver the services.
4. Contextual factors: the regional context is critical to interpret ratings, as a role might be legitimate, have the capacity and capability, but there may be a lack of awareness in the community of the function the role performs, which could be related to the maturity of the innovation ecosystem, historical perceptions, or even personalities of leaders in the ecosystem.

***Table 2:*** *Overall assessment of Queensland's ecosystem resilience to support innovation-driven entrepreneurship*

| | | Economic Development Organisation | Government | Peak body | University | Incubator | Chamber of Commerce | Service provider | Education Provider | Corporate | Investor | Local SME | Schools |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic | Support | | | | | | | | | | | | |
| Social | Trust | | | | | | | | | | | | |
| | Diversity | | | | | | | | | | | | |
| Institutional | Advocacy | | | | | | | | | | | | |
| | COVID-19 | | | | | | | | | | | | |
| | Connection Internal | | | | | | | | | | | | |
| | Connection External | | | | | | | | | | | | |
| | Collaboration Internal | | | | | | | | | | | | |
| | Collaboration External | | | | | | | | | | | | |

## 10.4 Overall rating of community resilience indicators by role resilience

There are variations between how organisational roles are perceived and contribute to aspects of community resilience from the expert surveys and interviews. Through analysis and interpretation of the data collected, findings emerged in relation to how roles were perceived to contribute to community resilience for innovation-driven entrepreneurship and the sustainability of those roles regionally.

### Highly rated roles

Table 2 shows organisational roles that were rated as most enabling community resilience include:

- Economic development organisations,
- Government,
- Peak bodies,
- Incubators, and
- Universities.

Economic development organisations, government, peak bodies and universities tend to have a dominant presence in regions. Organisations that have existed over a longer-term are perceived as legitimate, with formal governance processes in place. In most regions these organisations allocate resources to support entrepreneurial activity through specific initiatives, programs, or as part of their regional strategies. During 2020 many of these organisations established task forces or committees to respond to the COVID-19 pandemic. In general, these organisations were therefore positively assessed. However, the extent to which diversity for innovation-driven entrepreneurship was rated as moderate apart from government and university.

Incubators by comparison tend to be primarily focused on supporting emerging firms and promoting opportunities related to novel technologies and business models. Incubators were expectedly rated highly on most indicators of community resilience. Hubs that provide incubation and support to accelerate business development are diverse across the regions in terms of the services they offer and their target customers.

A challenging aspect of incubators is their legitimacy as this role and organisational form is still in an emergent phase in Australia. Their legitimacy influences their business models for their ongoing sustainability within regional communities, as incubator funding models are still ambiguous. Yet they are highly rated in providing entrepreneur support for emerging growth-focused ventures. Their specialised focused on nurturing growth-focused ventures should be considered based on an understanding of incubators' capacity to deliver against expectations reflected in the expert's ratings.

Incubators can struggle to deliver a full suite of services to support diversity and entrepreneurship support while maintaining financial sustainability. Incubators in some regions may be supported through government, while others survive through goodwill and volunteering or rely on collaborative funding models. In other regions the functions of the incubator role may be performed by a suite of

local service providers or an extension of services by the local university branch or economic development organisation.

## Moderately rated roles

Roles that were rated as moderately contributing to community resilience were:

- Chambers of Commerce,
- Service providers, and
- Education providers

Chambers of commerce and service providers were rated as enabling community resilience with regards to help firms adapt to the challenges that COVID-19 presented. Chambers of commerce provided a way for many small regional firms to be heard and have their views represented to state and federal government during the crisis, while service providers gave advice on available support and actions small firms could take to survive and adapt to the uncertainties and challenges. Chambers of commerce were also seen as supporting internal connections and collaboration within a region, as they focus on developing networks and connections within a region. However, chambers were not rated highly to promote connections and collaboration outside the region. These external relationships are often conducive to bringing new business opportunities into regions. Similarly chambers of commerce were also not rated highly as supporting innovation-driven entrepreneurship or supporting diverse business groups. As chambers often focus on existing micro and small firms that may dominate a chamber through their membership, these members' interests are likely to be prioritised within chambers. The role that chambers play in providing functions of support for diverse communities, external collaborations, and innovation-driven entrepreneurship can be considered relative to other roles in the community and should be interpreted against the volunteers that serve in leadership positions.

Service providers are commercial professional service firms who provide services such as legal, finance, marketing, information technology, and business consulting services to support innovation-driven entrepreneurship. Within regions, the target markets of these firms are often other micro and small firms, that might not have innovation or growth-focused goals. While service providers often have close business relationships with established firms, the ratings reflect that their services may not be perceived to provide targeted support for entrepreneurial activities. Service providers were rated as low in supporting connections and collaboration within and outside of regions, reflecting that the function is not their primary or secondary focus.

Education providers such as TAFE and private training organisations that provide skills-focused training were rated positively to support diversity, as many newcomers to a region, migrants and immigrants enrol to obtain the required accredited qualifications needed to work within specified industries. Despite having access to and developing the skills and competencies of their students, these organisational roles do not see their role as supporting innovation-driven entrepreneurship and are rated low on many indicators such as entrepreneurship support, advocacy, their COVID-19 response, or connections and collaboration.

## Low rated roles

Roles not rated highly in contributing to community resilience in supporting entrepreneurial activity include:

- Corporates
- Investors
- Local small and medium enterprises, and
- Schools.

There was a great variation between regions in terms of how these roles are seen in their participation in the local regional ecosystem.

Local small and medium enterprises are prevalent in regional communities, which is expected given 97% of Australian businesses are small. Many of these firms are established and older than 3 years. These firms tend to be primarily focused on achieving their own business outcomes, and not supporting entrepreneurship in the community specifically, although information may be shared in closed networks and openness to contribution to local innovation networks.

Established firms can be a significant source of innovation and entrepreneurial activity within regional communities. Entrepreneurial activity and innovation-related activities is often developed out of or in coordination with established firms with strong industry connections and intimate knowledge of the problems that need to be addressed. The relatively low perception of these firms participation to support community resilience and entrepreneurial activity provides the opportunity to develop strategies and programs to showcase their involvement, and better integrate established firms in entrepreneurial activity that has a direct benefit to both regional entrepreneurship as well as established business outcomes.

Investment in early-stage innovation-focused entrepreneurship has grown over the last decade. Australia experienced a record year for startups in 2020 at $1.6 billion, doing fewer but more high-value deals[18], and Q1 2021 was again another record period by value[19]. There has been an increased focus on using digital platforms to connect founders and investors, yet in regional Queensland investor involvement within regional ecosystems is somewhat limited. Studies from the United States suggest that the majority of angel investors were previously a founder or CEO of their own startup, tend to invest in groups and are dispersed across the country[20]. In the last three years several initiatives and programs have been established to grow an angel investor network across Queensland and increase investor interest in investing in early-stage businesses and digital and technology focused business opportunities. International studies point to the need to develop regionally successful ventures and founders to grow local capacity and experience of angel investor networks. Findings from this research illustrates that there is still a lack of perceived participation by investors in regional innovation ecosystems.

[18] KPMG, 2021a. *Record year for Australian startups with US$1.6 Billion VC invested*
[19] KPMG, 2021b. *Venture Pulse Q1 2021 Global analysis of venture funding*
[20] Huang, L. et al 2017. *The American Angel*.

Primary and secondary schools are expected to equip young people with skills for the future, including entrepreneurial mindsets, skills in emerging technology, and preparing for advances in changes to sectors relevant to the communities such as agriculture. The capacity and capability for schools to meet these needs can be a challenge, particularly in regional communities. Some individual schools provide dedicated programs and some regions have emerging collaborative structures to support schools across the region. The results from this research reflect that schools are not rated highly for impact on community resilience related to areas of innovation ecosystem contribution, which could be attributed to a lack of awareness among the ecosystem roles.

### 10.4.1 Role sustainability

In addition to rating roles, respondents were asked to indicate whether the roles they were evaluating was performed by a single individual, a single organisation or business, or multiple organisations working separately or together. The question is intended to provide an indication of how many roles are involved in particular ecosystem functions. This provides an indication of redundancy in the system. In simple terms redundancy in social system refers to duplication of critical system components to ensure reliability. For example, in communities with smaller populations a few individuals or organisations may fulfill multiple roles such as the owner of a social media agency also coordinating the local innovation network, however specialist roles such as angel investment are less likely to filled by individuals with a broad skills set. There can be low redundancy when the function of a role is dependent on only one or two people or organisations, which in turn inhibits a region's resilience.

The findings highlight roles where there may be a lack of redundancy in a region, limited by a single person or organisation. Local SMEs and service providers would be expected to be limited in multiple organisations operating collaboratively, reliant on business networks such as chambers of commerce, peak bodies, and economic development organisations. Roles of incubators and investors are often limited in number, resulting in lower multiple points of collaboration.

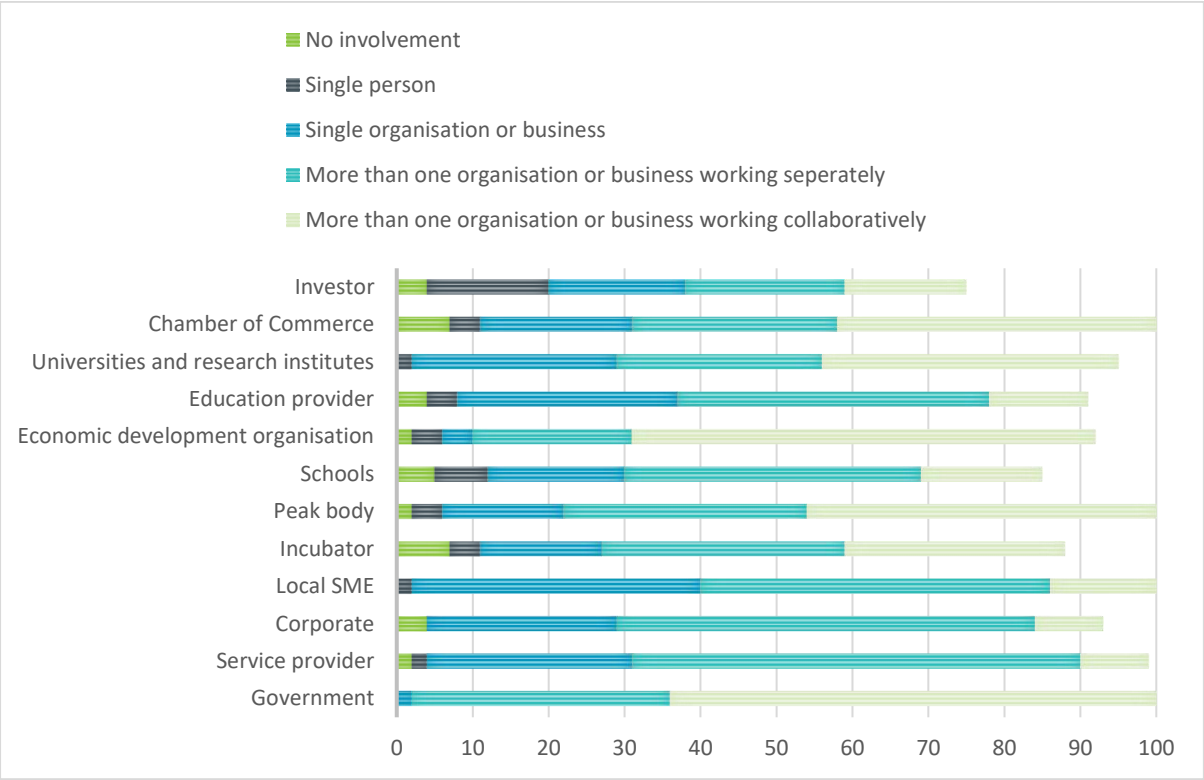



***Figure 33:*** *Role sustainability*

## 10.5 Mackay Isaac Whitsunday assessment of dimensions of community resilience

In the MIW region nine respondents, viewed as experts in the local ecosystem, due to their local knowledge and roles shared their ratings of their own role and 11 other roles. Respondents identified as fulfilling the roles of chamber of commerce, economic development organisation, incubator, local SME, peak body, and service provider.

When reviewing the resilience indicator ratings two aspects should be considered when viewed together:

- Alignment: this refers to degree of agreement in how respondents rated each role for each indicator.
- Centralised vs. distributed nature of ratings: respondents ratings reflect whether a particular community resilience indicator is centralised in a small number of roles, or whether several roles address that indicator, which would mean roles are distributed and many roles contribute to that indicator. This assessment identifies the nature of innovation ecosystem leadership in a region, the nature of redundancy of services, and characteristics of capacity and capacity in roles. This is examined in Table 3's *comparative assessment by role*.

Table 3 shows the extent that the ratings for each role are similar or different across roles in the total sample and for the MIW region. If the ratings are similar across each role, the function of the indicator is considered to be distributed across roles. If there is a larger difference in ratings with some roles being rated significantly higher or lower than other roles, then the function of the indicator is considered to be centralised in some roles. The ratings are based on the relative distribution of ratings across roles, categorised as distributed, semi-distributed, semi-centralised, and centralised.

***Table 3:*** *Comparative assessment of centralisation/distribution of roles per resilience indicator*

| COMMUNITY RESILIENCE DIMENSION / INDICATOR | | TOTAL (N=85) | MIW REGION (N=9) |
|---|---|---|---|
| **Economic** | Support | Semi-centralised | Centralised |
| **Social** | Trust | Distributed | Distributed |
| | Diversity | Distributed | Centralised |
| **Institutional** | Advocacy | Distributed | Centralised |
| | COVID-19 | Centralised | Centralised |
| | Connection Internal | Semi-centralised | Distributed |
| | Connection External | Centralised | Highly centralised |
| | Collaboration Internal | Semi-distributed | Semi-distributed |
| | Collaboration External | Centralised | Semi-centralised |

*Entrepreneur support* was centralised in MIW, which is fairly similar to the case in other regional ecosystems.

For the social dimension, ratings for *trust* was distributed across various roles for the MIW region, similar to roles in other regional ecosystems. *Diversity* was centralised in the MIW region, whereas the rating was distributed compared to other regional ecosystems.

Regarding the institutional dimension, *advocacy* for entrepreneurs was centralised in the MIW region, yet it was distributed in other ecosystems. *Response to COVID-19* was centralised both for MIW and other ecosystems. *Internal connection* in MIW was distributed, and *internal collaboration* was semi-distributed, whereas *external connection* was highly centralised and *external collaboration* was semi-centralised.

## Comparative analysis by role

Table 4 show the ratings overall for regional Queensland innovation ecosystems and for the MIW region, colour coded relative to roles. Each row is colour coded as high to low relative to ratings against each community resilience indicator.

Organisational roles that were rated as most enabling community resilience are on the economic, social and institutional dimensions were:

- Economic Development Organisations,
- Government, and
- Peak Bodies

The MIW region's ratings were fairly consistent compared to ratings for other Queensland innovation ecosystems, which demonstrates the consistency of indicators, as explained in the next section.

***Table 4:*** *Overall community resilience assessment of regional Queensland innovation ecosystems compared to MIW assessment*

**OVERALL REGIONAL QUEENSLAND COMMUNITY RESILIENCE ASSESSMENT FINDINGS (N=85)**

| | | Economic Development Organisation | Government | Peak body | University | Incubator | Chamber of Commerce | Service provider | Education Provider | Corporate | Investor | Local SME | Schools |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic | Support | | | | | | | | | | | | |
| Social | Trust | | | | | | | | | | | | |
| | Diversity | | | | | | | | | | | | |
| Institutional | Advocacy | | | | | | | | | | | | |
| | COVID-19 | | | | | | | | | | | | |
| | Connection Internal | | | | | | | | | | | | |
| | Connection External | | | | | | | | | | | | |
| | Collaboration Internal | | | | | | | | | | | | |
| | Collaboration External | | | | | | | | | | | | |

**MIW FINDINGS FROM RESPONDENTS (N=9)**

| | | Economic Development Organisation | Government | Peak body | University | Incubator | Chamber of Commerce | Service provider | Education Provider | Corporate | Investor | Local SME | Schools |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Economic | Support | | | | | | | | | | | | |
| Social | Trust | | | | | | | | | | | | |
| | Diversity | | | | | | | | | | | | |
| Institutional | Advocacy | | | | | | | | | | | | |
| | COVID-19 | | | | | | | | | | | | |
| | Connection Internal | | | | | | | | | | | | |
| | Connection External | | | | | | | | | | | | |
| | Collaboration Internal | | | | | | | | | | | | |
| | Collaboration External | | | | | | | | | | | | |

### 10.5.1 Economic: Entrepreneurship support

A region's support for entrepreneurial activities builds resilience through economic diversification and renewal from new businesses. The findings show that within the MIW region, organisations rated highly for providing entrepreneurship support are:

- Service providers (professional firms)
- Economic development organisations, and
- Incubators

The importance and regard for professional service providers to support innovation-driven entrepreneurship is also echoed in the business innovation survey. Accountants, specialist agencies such as a marketing agencies or legal practices and mentors were identified as services firms access for support. This regard for service providers is higher within the MIW region, compared to how service providers are rated in Queensland overall. The role of economic development organisations and incubators is recognised by other ecosystem roles and is evaluated slightly more positively compared to the rest of Queensland.

Education providers such as TAFE's and training organisations, as well as schools and chambers of commerce were less favourably viewed by other organisational roles in providing entrepreneurship support in the MIW region.

### 10.5.2 Social: Trust

*Trust*, as a social community resilience indicator, denotes how an organisational role meets expectations, fulfills promises and refrains from misusing power for private benefit. Trust allows for efficient and greater access to resources for more people and improved speed of services. A high rating of trust is expected to be attributed to positive experiences between roles. A lower rating of trust across all roles may be due to a lack of overall entrepreneur support, while lower trust ratings on specific roles may be due to a negative experience with that role.

Roles rated high on trust in the MIW region are:

- Economic development organisations,
- Incubators,
- Service providers, and
- Peak bodies

Economic development organisations, incubators and peak bodies rated high on trust, similar to ratings for Queensland overall. Service providers in the MIW region scored higher on trust, compared to this role in the rest of Queensland.

Corporates were rated the lowest on trust within this region, similar to the rest of Queensland.

### 10.5.3 Social: Diversity

*Diversity*, as a social community resilience indicator, represents how diverse community groups and minorities are supported to introduce of new ideas and businesses and reduces local inequality through inclusivity. Support for diverse communities and inclusion is associated with increased

capacity in roles with targeted programs. Inclusion can also be associated with representation of leaders from diverse communities, which may be lacking in regional communities.

Roles rated high on diversity in the MIW region are:

- Peak bodies
- Government, and
- Schools

Peak bodies and schools are both organisational roles that engage with minorities through employment opportunities and educational opportunities, facilitated through government strategies, programs and priorities, which are visible to organisational roles with the MIW region.

Incubator, investors, and chambers of commerce were rated low on supporting diversity.

### 10.5.4 Institutional: Adaptation support - COVID-19

Respondents were asked to consider the extent to which roles supported adaptation in their community related to COVID-19 support. This issue was top of mind when the expert survey was conducted. Community resilience is often associated with change and disruption. While most entrepreneur-related disruption is gradual, the global pandemic provided an opportunity to consider where the community might turn to for impacts related to more immediate disruption outside of other environmental impacts such as natural disasters, to business-related disruptions, associated with health-related restrictions.

Roles rated high on providing adaptation support in the MIW region are:

- Government
- Peak bodies
- Chambers of Commerce
- Service providers and
- Economic development organisations

Business networks such as the chamber of commerce, peak industry bodies, service providers and economic development organisations within region formed a critical conduit for relaying firms ‘grassroots’ experiences to State and Federal Government. This feedback aided government responses to the disaster to provide broad adaptation support for businesses.

### 10.5.5 Institutional: Advocacy

Advocacy provides a voice for the entrepreneur community which can be otherwise overlooked in traditional economic development strategies or by industry-specific advocacy groups. Advocacy refers to raising awareness for, promoting and generating support for entrepreneurship.

Roles rated high on advocacy in the MIW region are:

- Economic development organisations
- Peak bodies, and
- Government

These roles tend to advocate for a region, or industry based on their mission and mandate. Within the MIW region several State government representatives work with regional organisations to prioritise future-focused infrastructure projects that support the region's development. Schools, chambers of commerce, incubators and universities were rated low on advocacy. While roles such as schools and incubators legitimately focus on education and providing business support, they can still play a critical role to illustrate the attractiveness and liveability of a region. Similarly, universities and chambers of commerce contribute to the reputation of a region as being supportive of innovation and entrepreneurial growth. These organisational roles can be drawn on and involved to improve the reputation of the MIW-region as being supportive of innovation-driven entrepreneurship.

### 10.5.6 Institutional: Connection and collaboration

Connection and collaboration are essential to a vibrant entrepreneur ecosystem, both internally within an ecosystem and externally to those outside of the boundaries of the ecosystem.

Roles were assessed based on the extent to which they were involved in actively facilitating connections within the local community (internal) and connections outside the region (externally). For collaboration roles were assessed based on whether they were actively involved in supporting collaboration, described as working together for a common cause within the community, and outside the region.

These indicators determined the extent that roles were considered 'boundary spanners' to bring new ideas into an ecosystem or subsystem and break down barriers between roles and across regions. Boundary spanning has a dual effect on innovation success in that it influences new product, service and process innovations, contributing to regional performance, as well as new knowledge generation and creation[21].

In Queensland generally and across roles, external connection and collaboration rate low compared to functions internal to the community. Connection and collaboration can also be more prominent in specific functions, as demonstrated in a region-by-region breakdown of connection and collaboration activities across roles.

For the MIW region internal connection and collaboration are rated highly for organisational roles:

- Economic development organisations
- Government, and
- Peak bodies.

For external connection and collaboration organisational roles rated highly are:

- Economic development organisations
- Peak bodies, and
- Universities.

As these roles tend to prioritise external relationships, collaboration and knowledge outside their regions, they fulfill important boundary spanning functions. Incubators can fulfill a more important contribution on these indicators by actively facilitating connections and collaboration, to support their mission to drive emergent opportunities, technologies and business development and support market development of businesses inside a region to external markets.

[21] Keszey, T., 2018. Boundary spanners' knowledge sharing for innovation success in turbulent times. *Journal of Knowledge Management, 22*(5), pp. 1061–1081.
Cunningham, J. A., 2019. Principal investigators and boundary spanning entrepreneurial opportunity recognition: a conceptual framework. In: E. E. Lehmann, and D. B. Audretsch, (Eds.), *A Research Agenda for Entrepreneurship and Innovation*. Edward Elgar Publishing. pp. 55-73.

### 10.5.6 Open Responses: Innovation ecosystem enablers and inhibitors

Respondents were also asked to provide feedback on three enabling and three inhibiting contributions to the innovation ecosystem in their region.

The thematic analysis in Table 5 provides some insight into the ratings. Direct quotes from respondents were coded as enablers and inhibitors during first-round open coding. During the second-round axial coding these were then associated with the themes of entrepreneurial support, capacity development, funding and monetary resources, innovative culture, collaboration, research and statistics, key role players, local innovation networks, infrastructure, promotion of innovation and bureaucracy[22].

***Table 5:*** *Thematic analysis of innovation ecosystem enablers and inhibitors based on direct quotes from respondents*

| THEMES | ENABLERS | INHIBITORS |
|---|---|---|
| **Entrepreneurial support** | 1-1 business *support.*<br>Access to *resources* for entrepreneurial endeavours.<br>*Events* that focus on solving real world problems, because if it's a problem here then it is likely to be a problem globally.<br>Offering *programs* that make participants focus on a global market - startup onramp programs.<br>*Support networks* are there via Split Spaces, RCoE, RIN etc.<br>*Workshops* helping with local pressure points.<br>Personal *supporters.* | Established organisations designed to *support* or help progress local innovation.<br>*Funds to support* early innovation testing and trailing of ideas and opportunities - by nature innovation means some things do not work - you learn from what does not work as well as what works - many public funded innovation grant programs favour early adoption vs. innovation - investors need to understand innovation carries higher risk than early adoption or mainstream adoption.<br>*Lack of people resources* within the innovation hub to allow for better engagement with Community to promote and engage with our potential innovators / investors.<br>Limited access for funding for *pilot programs.*<br>***Capacity development***<br>Not entirely sure what people's perception/understanding of innovation is in population - for me, innovation and its commercial adoption follows phases of adoption in a population (innovation, early adoption, early mainstream, middle mainstream, late adopters and laggards) - innovation *support would ideally tailor programs* aligned to these adoption profiles and in doing so enhance rate of adoption and innovation reaching its tipping point in a given population.<br>*Understanding the Innovation process* - How to take an idea through to commercial product is |

[22] More details on the coding process is available in Appendix B, section 14.1.6.

| | | |
|---|---|---|
| | | something that is often too scary for SME's to think about so a lot of potential innovations go undiscovered. |
| **Capacity development** | | *Limited qualified staff* to assist in innovation design and rollout.<br>*Time and staff capacity* within SME's are limited and understanding of the innovation process by SME's. |
| **Funding and monetary resources** | *Innovation grants, support and funding* - where funding supports early feasibility and business plan development vs. funding for the infrastructure - funding to support concepts development is required.<br>Money | *Budget* - cash flow is always king within SME's and it is difficult to allot chunks of money to R&D.<br>Constantly *chasing funding to provide support* for grass roots innovators pre revenue.<br>*Funds to support information sharing and network development* - ability to surround innovators with like-minded people and support the network of innovators. |
| **Innovative culture** | Promotion of the importance of innovation.<br>There is a *good innovation mindset within the SME community - especially within the METS sector*.<br>*Innovative culture* led by local government.<br>*Sharing the journey of local founders* to highlight the opportunities available to those brave enough to embark on a startup and providing support for those that do. | Industry and government policy and operations which *stifle innovation by not supporting a willingness to change* - innovation is synonymous with a change state that drives improvement in financial, social, environmental or cultural outcomes - the interplay between and across people, profit and planet considerations - means that often innovation is held back due to people having differing views on the innovation and its impacts across financial, social, environmental or cultural outcomes.<br>Low engagement by business community.<br>Public servants.<br>Self-centred businesspeople.<br>Those seeking to support innovation being more focused on their role and promotion of their role as facilitators of innovation than the success of the innovators themselves. |
| **Collaboration (internal)** | *Collaboration* is starting to occur between businesses and is starting to lead to better innovations.<br>*Collaboration* opportunities. | *Collaboration between stakeholders and willingness* to promote the offering of others. This can be a result of the person within a role rather than an organisation. I have experienced a significant change of behaviour within an organisation due to a change of leadership. |
| **Research and statistics** | Access to reliable data and statistics to make informed decisions. | |

| | | |
|---|---|---|
| **Key role players** | Local champions.<br>Mackay City Council.<br>GW3.<br>Support networks are there via Split Spaces, RCoE, RIN etc. | General information dissemination.<br>Working in silos. |
| **Local innovation network** | From Mackay's point of view, we are proud to have a **strong voice being GW3** and in particular their ability to retain high-quality data for industry segments to make necessary judgement calls. However, what we do require within our region is the link *between this and fellow advocates/stakeholders importantly, facilities that can assist with the above i.e. education hubs*. We believe that is necessary to paint a clearer path for those entrepreneurs to be provided ***by industry leaders***. An example would be a regional-based entrepreneurial website operated by GW3 may assist in provided this link.<br>Sharing of information and ensuring people are aware of what is happening and what the opportunities are and providing a *network of shared learnings and experience* - need a business to business, research to business, research to research information *sharing platform* and strategy and set of operations. | |
| **Infrastructure** | Access to up-to-date technology and network speeds. | Limited network speeds and regional networks. |
| **Promote innovation** | | More spot lighting regional innovation, as lack of awareness (internal and external to the region) results in skewed perception.<br>Innovation is the key to the future of a regional economy. More needs to be done to promote the importance of innovation. |
| **Bureaucracy** | | Council regulation. |

# 11. Discussion: Ecosystem resilience assessment implications

The findings provide an assessment of the perceived relational strength of the regional ecosystem's community resilience. It can be used to develop strategies to cultivate capacity and capability in the ecosystem to better support innovation and entrepreneurial activity in the MIW region. The eight areas below are identified based on an understanding of literature, insights from the research, and observable activities in regional communities in Australia.

## Distributed leadership and coordination for entrepreneur and innovation support

An issue arising from the research is: "Which role is accountable for developing the strategy to address the research findings?"

One response may be everyone, but without ownership there can be a lack of accountability and coordinated action. A second option may be to place the accountability on a single role that is rated highly across community resilience dimensions, but consideration needs to be given to competing agendas inherent to the role as well as capacity and capability for the additional coordination and collaboration activities. A third option is to develop a new role supported by other established roles that has a dedicated function for supporting development of the local innovation ecosystem.

Leadership in entrepreneur ecosystems is by nature distributed among various roles. There is growing support for central coordination of leadership within the ecosystem, involving roles across the ecosystem. The emerging role, comprised of membership from multiple roles in the community, facilitates a form of collective impact and forms a backbone structure to support and develop innovation driven entrepreneurial activities.

The development of an effective local entrepreneur ecosystem is a complex challenge that no single role can address. Collective structures are emerging that exhibit characteristics of accountability and transparency, legitimacy, equality policies, a participatory organisational structure, social innovation and entrepreneurial orientation to provide governance in the innovation ecosystem[23]. Collective impact or collective action frameworks address challenges in innovation ecosystems to develop managerial and operational skills among community leaders, support agreed central leadership, and address bottlenecks from decisions made by consensus[24]. Organisations that engage in collective impact are characterised by having a common agenda, developing shared measurement, participating in mutually reinforcing activities, engaging in continuous communication, and participating in backbone support. This backbone structure performs the following activities: (1) guide vision and

[23] Vázquez-Maguirre, M., 2018, Sustainable Ecosystems Through Indigenous Social Enterprises. In: H. Alves, N. Krueger and J. Park, *Entrepreneurial, Innovative and Sustainable Ecosystems: Best Practices and Implications for Quality of Life.* Springer International Publishing. pp. 173-189.

[24] Lobo, I. D., Velez, M. and Puerto, S., 2016. Leadership, entrepreneurship and collective action: A case study from the Colombian Pacific Region*, International Journal of the Commons 10*(2), pp. 982–1012.

strategy; (2) support aligned activities; (3) establish shared measurement practices; (4) build public will; (5) advance policy; and (6) mobilize funding[25].

Structures of backbone organisations can include loosely formed steering committees, public agencies, mission-orientated not for profits, and single-funder based such as a family office or foundation. In Australia, backbone structures focused on entrepreneur activity have predominantly been structured as loosely formed steering committees evolving into mission-orientated not for profits. Another strategy for establishing a backbone structure is to be supported by an existing role such as an economic development organisation or local government and evolving into a membership-based structure. A strategy relating to collective impact may also acknowledge the low rating for collaboration from the results for the MIW region.

The findings highlight functions that can be performed by a backbone structure in the community:

- **Leverage role strengths in the community**
  Some functions in the ecosystem such as external collaboration or diversity will be specialised and fit with certain ecosystem roles. By specialising on a strength of a particular role, community resources can be directed towards specialist functions to maximise the impact for the community.
- **Foster coordination between roles**
  Roles can often be perceived as operating in silos, making functions difficult to access by everyone in the community. A coordination role can break down barriers and ensure greater access to roles and functions across the community.
- **Measuring and monitoring effectiveness and impact**
  There is often a lack of longitudinal data and measuring of a range of indicators to provide feedback on the health of regional entrepreneurial ecosystems. Yet independent assessment of ecosystem performance and health provide valuable direction for future-focused strategies. In addition, the actions and recommendations provided by reports like this and others, may not have an accountable organisational role assigned to address such actions. A centralised organisational role within a regional ecosystem would provide ownership of impact reporting as well as a trusted, coordinating role to support interventions across several organisational roles in the ecosystem.

## External boundary spanning

Boundary spanning describe individuals within an innovation ecosystem who bring new ideas to that system by linking internal regional organisations and networks to external information. Roles which fulfill this function contribute to community resilience by encouraging diversification and connecting

[25] Hanleybrown, F., Kania, J. and Kramer, M., 2012. Channelling Change: Making Collective Impact Work, *Stanford Social Innovation Review*.

the local community with resources. Respondents assessed boundary spanning of roles in terms of how those roles contributed to collaboration and connection outside regional communities.

In the MIW region internal connection and collaboration were distributed across roles, while external connection and collaboration were more centralised in roles. The findings the expectation that roles such as government, economic development organisations, peak bodies, and universities to have the mandate, capability, and capacity to support collaboration with those outside the community. However, boundary spanning for entrepreneurship is a specialist function that might not be directly supported by established roles. Roles focused on entrepreneurship activities such as incubators or investors rated lower on external connection and collaboration.

The implications for boundary spanning activities in the MIW region is to consider further cultivating collaboration and connection through dedicated roles and programs inclusive of multiple roles. If the connection and collaboration is through a single role, steps can be taken to ensure that access is not exclusive and is available to all. Conversely, enabling connection and collaboration through multiple roles can be coordinated through structured programs and initiatives to provide efficient communication.

### Investor networks

Investors were rated moderate to low across most dimensions of community resilience, illustrating the need to develop investor networks and incentivise involvement from this role. As deal flow for investors might be limited in some regions, external connections and collaborations could support the emergence of linking regional roles to established investor networks. If the investor role is reliant on a single or few people in a region, it could be at risk without support of additional providers or a succession plan. This finding requires a more in-depth exploration for the reason for such low ratings and to develop strategies to improve the functions of the role.

### Role sustainability and support for early-stage, innovation-driven entrepreneurs

Early-stage innovation-driven entrepreneurs often require additional support to access knowledge, networks, seed funds, and sustainable revenue models. There can be a gap in support for these ventures compared to support structures that exist for established firms or investment focused on established business models. Without local support, early-stage innovation driven entrepreneurs' ventures may not start, or entrepreneurs may move to more populated areas that offer a diverse range of early-stage business support.

Ratings for the entrepreneur support indicators in MIW rated lower across all roles compared to the overall ratings and was more centralised in a few roles. The implications are to consider the extent that early-stage entrepreneur support is sustainable, available, and delivered in appropriate roles across the region. School-based entrepreneurial integration and awareness

## Awareness and integration of school-based programs

Primary and high schools rated moderate for social dimensions of resilience but were not seen as positively contributing towards dimensions related to entrepreneur support, connection, or collaboration, similar to ratings in Queensland regional ecosystems overall. Ratings may be related perceived lack of awareness and integration with school-based entrepreneurial activities within the region. The findings suggest regional ecosystems require greater awareness and integration of school-based entrepreneurial programs within the ecosystem as a whole and clarify the functions that these programs fulfill.

## Integrate established firms and business networks

Established firms are a significant source of entrepreneurial activity in regional communities, as reflected in the business innovation survey. The resilience assessment findings show corporates as a role was rated relatively low on trust in terms of local entrepreneurial outcomes yet provides tremendous potential to be testers or adopters of regional innovations. The findings suggest that established firms can be better integrated into the innovation ecosystem and can provide direct benefits to both regional entrepreneurship as well as the established firms' outcomes. Examples of these opportunities include engaging local established firms in open innovation challenges relevant to their products and services, access to workforce skills, and opening new markets through entrepreneur ecosystem boundary spanning activities.

## Capacity and capability development

In the MIW region service providers, in the form of professional services, provide significant local support for entrepreneurship, COVID-19 adaptation and hold a high level of trust. However, service providers were rated lower for connection and collaboration. The capability and capacity of local professional services to enhance connection and collaboration, especially through transferring new knowledge, means these providers can upskill local business owners and build regional capacity for innovation-driven entrepreneurship.

# 12. Conclusion and Implications

The MIW Regional Innovation 2020-2021 report focused on measuring regional innovation by assessing three aspects:

- The innovation activity of firms in the MIW region was benchmarked against 2019 data of SEQ firms and 2014 Queensland and Australian firms, to assess the strengths within the region and identify priorities for action.
- Five cases reflecting how an entrepreneurial mindset supports businesses to innovate, even during times of uncertainty.
- The entrepreneurship ecosystem resilience was assessed on economic, social and institutional dimensions to determine how community resources are used and leveraged to enable the business community and supporting organisations thrive in dynamic environments characterised by uncertainty and unpredictability.

## 12.1 Business innovation

The business innovation findings indicate that only 8.5 percent of MIW firms consistently implement new-to-the-firm innovations, which is significantly lower compared to Australian firms who report 63.5 percent innovation. While the data for the MIW region was collected in a year of crisis and many firms were risk-averse, it shows the need to grow the percentage of innovative firms in the region to diversify the economy against mining boom-and-bust cycles, as well as natural crises, or health-related shocks.

MIW innovators show high adoption of digital practices such as implementing a social media strategy, have a mobile enabled website and an innovation strategy, and adopt contemporary practices such as using monthly financial statements (management accounts) and a formal business plan. More than a quarter (26.7%) of innovators also embrace smart technologies, automated business intelligence systems and use data integration, aligned with the MIW Transformation Region strategy. These innovators use knowledge-based innovation sources, critical to develop innovations of global relevance with the potential for growth and job-creation. These knowledge-based innovation sources are trade associations, peak bodies, chambers of commerce, and research institutes. To support regional economic diversifications, the technological basis of innovations should have the potential to be leveraged to address needs in a diversity of industries and not just focus on the dominant mining sector, as some of the case study firms demonstrate.

MIW innovators report higher business performance through increases in sales from new products and introduced services, improved profits per employee, profit and employee growth and improvements in labour productivity.

Firms in the MIW region show high levels of awareness of the support available. Innovators are likely to use support in the form of business skills, workshops, forums and seminars, grants and

mentoring. The most trusted sources of support are accountants, specialist agencies such as social media marketing and legal advisors and mentors.

To continue to develop the innovative potential of businesses in the region it remains a priority to promote innovation, especially to increase new-to-the firm innovation among firms and stimulate new-to-the industry innovations. Encouraging firms to adopt digital innovations is likely to improve productivity, as shown in the case studies. Continuing to develop local business role models' by showcasing their business practices through case studies will support these efforts and show the performance benefits of innovation. These findings suggest that targeting firms 3 to 10 years old with growth potential with business support such as accelerator programs, is likely to pay off. Involving local small firms in the downstream opportunities from regional infrastructure investments, for example as new precincts such as health or food hubs is likely to engage the local business community to embrace and make the most of the opportunities from such developments.

Capacity development focused on transforming the economy and local talent to contribute to 4IR opportunities by utilising smart technologies, should be continued, in multiple industries to diversify the economy in non-mining industries.

This study is not without its limitations, as the firm innovation survey's findings could be strengthened through a larger sample. Similarly, the MIW region might seek to continuously measure local business confidence, contemporary practices, innovation priorities and performance outcomes to inform regional economic development strategies. To ensure representative views of local businesses are reflected in survey findings a regional business research panel, also known as a group of business owners who have agreed to complete online surveys, should be developed. Such local research panels have the potential to inform regional business-focused strategies.

## 12.2 Ecosystem resilience assessment

The ecosystem resilience assessment highlights several priorities to build resilient communities to support innovation-driven entrepreneurship.

Roles that are highly regarded as supporting innovation-driven entrepreneurship across economic, social and institutional dimensions are economic development organisations, government and peak bodies in the MIW region.

The findings emphasise the importance of distributed leadership and coordination for entrepreneurship and innovation support among multiple roles within regions and the functions backbone structures like GW3 can fulfill. Backbone structures fulfil important functions and coordinate roles within a region in three ways:

- First regional strengths in the community can be leveraged, by assigning some specialised functions such as boundary spanning (bringing new ideas and resources to regional ecosystems) as the responsibility of a few specific roles, thus directing community resources effectively.
- Second coordination between diverse roles can be fostered through a backbone structure.
- Third regional ecosystem goals and priorities can be measured and monitored for ecosystem health and impact, as measurement can be outsourced to an impartial party to avoid biased findings.

The need for external boundary spanning roles, who bring new ideas into the ecosystem, to address perceived weaknesses in external connections and collaboration for innovation-driven entrepreneurship, was common across most regions. Some roles are well-poised to prioritise this function; yet care should be taken that these external functions support innovation-driven entrepreneurship.

There is a critical need to develop investor networks and incentivise involvement from this role in many regions. As the deal flow for investors might be limited in some regions, compared to metropolitan areas, external connections and collaborations could support the emergence of linking regional roles to established investor networks.

Incubators play a crucial role regionally, therefore care should be taken to ensure their sustainability and promote their legitimacy. In some sparsely populated regions like Isaac, an incubator, like Split Spaces might find it challenging to reach emerging and established firms, however hybrid models of interaction and support can make incubator and business development services more readily available.

Regional ecosystems require greater awareness and integration of school-based entrepreneurial programs within the ecosystem as a whole. In addition, established firms and business networks should be integrated to support innovation-driven entrepreneurship, especially providing opportunities for engagement, connection and collaboration.

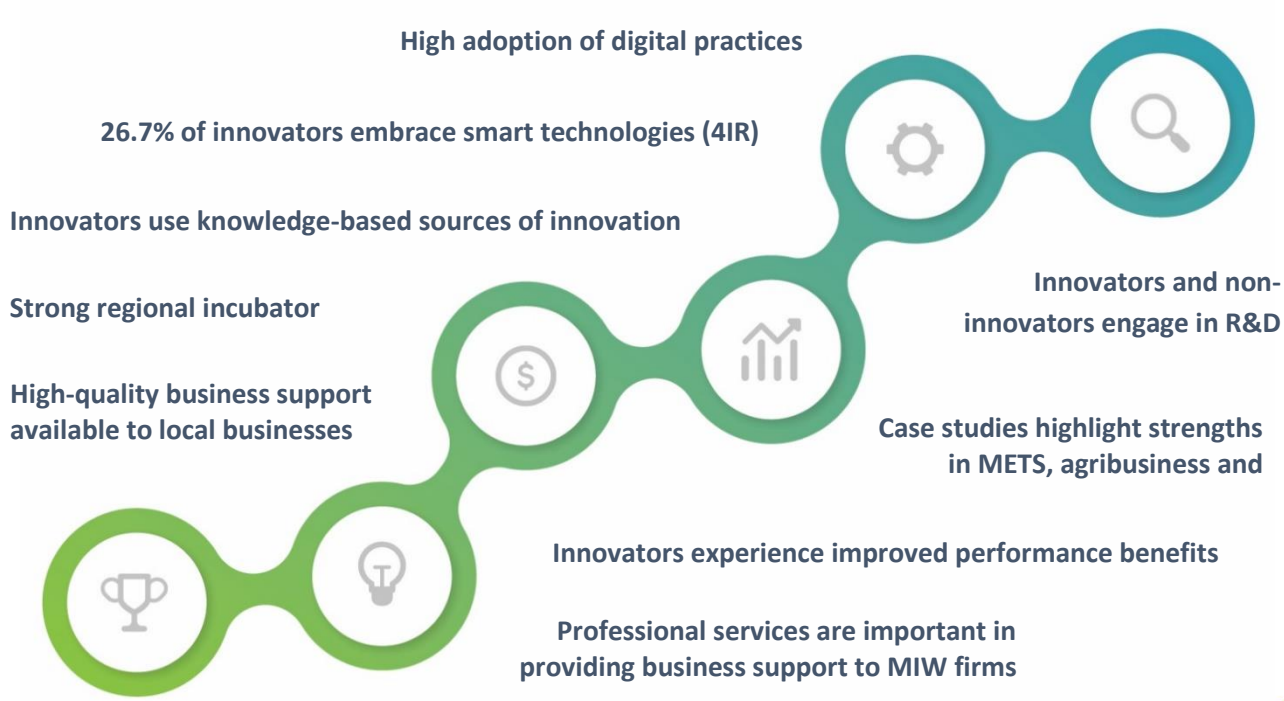
Developing resilient ecosystems require ongoing capability and capacity development, given the diversity of roles involved and multiple functions to be fulfilled in a vibrant regional ecosystem.

## 12.3 Innovation benchmark assessment: MIW region

Based on the findings of the business innovation study, the case studies and ecosystem assessment, this section integrates the findings of these three studies in an assessment of regional strengths and priorities through a thematic analysis to conclude the report.

*Strengths:*

- High adoption of digital and sophisticated business practices
- 26.7% of innovators embrace smart technologies (4IR)
- Both innovators and non-innovators engage in research and development (R&D)
- Case studies highlight regional strengths in METS, agriculture and tourism
- Innovators use knowledge-based sources of innovation e.g. trade associations, peak bodies, chambers of commerce and research institutes.
- Professional service firms such as accountants, specialist agencies and mentors play an important role in providing business support to MIW firms.
- High-quality business support is available to local businesses
- Innovators improve their business performance through increased sales, profits, growth and productivity improvements
- A sustainable regional incubator provides early-stage entrepreneurs with access to knowledge, networks and seed funds, and should be supported to develop a sustainable business model.
- Economic development organisation, government and peak bodies recognised for providing entrepreneurship support and advocacy.
- Economic development organisation has the opportunity to plays a joint leadership role and coordinate other roles in the innovation ecosystem to leverage regional strengths.




**Economic development organisation facilitates joint leadership and coordination. Economic development, local gov and peak bodies recognised providers of entrepreneurial support and advocacy.**

*Priorities:*

- Promote business innovation in the region by focusing on
  - novelty of innovations such as new-to-the firm and new-to-the industry innovations
  - digital and technological innovations that improve productivity
  - continuing to highlight local role models through case studies
  - the performance benefits that is realised through innovation.
  - Use forums like professional conferences, trade associations, chambers of commerce, and research institutes to develop the novel innovation capacity of the region.
- Target 3 to 10 years old businesses with growth potential as these businesses are likely to benefit from business development support and accelerator programs
- Increase awareness of the role of schools and school-based entrepreneurial programs
- Involve trusted professional service firms when disseminating business and innovation opportunities and programs.
- Continue to support capacity development to advance local firm capacity and talent to utilise smart technologies in multiple industries to diversify the economy
- Continue to develop the investor role in MIW region through making businesses aware of opportunities, requirements and potential investors or established firms of novel startups and innovations.
- Measure local business innovation priorities, performance outcomes and confidence to inform regional development strategies.

# 13. Appendix A: Firm innovation survey

## 13.1 Method

### 13.1.1 Survey sample

Qualtrics business panel and entrepreneur panel data were used to identify a stratified sample (based on the Australian Bureau of statistics (ABS)) targeting firms in the Mackay Isaac Whitsunday region for 2020 data collection, using postal codes to ensure regional targeting. In addition, responses were supplemented with data from local firms, which the Greater Whitsunday Alliance distributed and encouraged their network to complete the survey, as well as support organisations and networks in the region.

### 13.1.2 Survey dissemination and response rate

The survey was conducted from January to March 2021. It was distributed online using the panel, reaching more than 450 MIW firms. The owner/manager or senior executive within each firm was asked to complete the questionnaire online. The response rate was 21.5 per cent. 97 valid responses were used to represent the MIW regional data. MIW data was weighted to limit response bias, meaning that responses from firms of different sizes and industries were weighted in proportion to their presence in the general population of Australian firms[26]. The 97 responses were then added to the database from 2019 with 248 South East Queensland firm responses and the 2014 DSITIA-University of Queensland innovation dataset of Australian firms resulting in a final dataset of 1,754 firms.

### 13.1.3 Survey instrument

The questionnaire was developed by the Centre for Business Research (CBR) at Cambridge University. Findings and data gathered through this survey has been widely used for publication in reputable journals.[27] Eighty per cent of the questionnaire has been used by CBR, UQ and Auckland University (NZ) in the past and has been proven to be reliable. The remaining part was developed to address the research objectives of this project, aligned to the goals of GW3 and Advance Queensland.

The existing CBR questionnaire was adapted in two ways. First, issues that are crucial to GW3's performance goals and the Advance Queensland regional innovation program were incorporated into the questionnaire. Second, questions were included to address the research objectives. The questionnaire contained 30 questions, which can generate more than 400 variables addressing the firm's general characteristics, innovation, competition and collaboration, finance and managerial

[26] Verreynne, M-L and Steen, J. 2014. *Queensland Business Innovation Survey 2014 Report*. Prepared for The Department of Science, Information, Technology, Innovation and the Arts. University of Queensland.

[27] Cosh, A., Fu, X., and Hughes, A., 2012. Organisation structure and innovation performance in different environments. *Small Business Economics*, *39*(2), pp.301–317.

Freel, M. S. 2005. Perceived environmental uncertainty and innovation in small firms. *Small Business Economics*, *25*(1), pp.49-64.

practices. The questionnaire took 15 to 20 minutes to complete. Responses were collected by USC and Qualtrics and respondents were guaranteed anonymity and confidentiality (as per the ethics approval of this project: A181147).

### 13.1.4 Level of analysis

This research focuses on firm behaviour related to innovation and the outcomes thereof, thus all analyses were undertaken at the organisational level of analysis. Results reported are generalised to regional firms (industry, firm size, age). Firms have the ability to adapt and change their behaviour, which is well established in the literature.[28] This report, however, draws on data collected at a point in time and is based on the 'representative firm' where models are specified. In all other cases, descriptive statistics in the form of occurrences or means are reported. These aggregated data satisfy the requirements of the reporting that this study informs.

### 13.1.5 Critical assumptions and limitations

As with all research projects, there are several limitations relevant to the reported results. First, the data collected for the MIW region relates only to 2020 performance and was collected in 2021. The MIW data was benchmarked against 2019 SEQ firm performance data and Queensland and Australian 2014 data. The findings in this report focus only on the available data for comparison purposes. Second, findings are reported based on the data of responding firms, and therefore it may be that innovation activity is higher or lower than reported, but, as there are no other wide-spread, representative databases available, it is not possible to make further comparisons. Third, as data was collected from the MIW region, not all industries were equally represented, therefore data needed to be weighted to be comparable. These results should be interpreted against this background. Finally, the questionnaire is based on self-reported data, similar to what is used internationally. Although consistency checks were performed, as is elaborated on in the next section, no secondary data items are available to confront the veracity of these responses.

[28] Schumpeter, J. A., 1934. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycles*. Cambridge. MA: Harvard University Press.

## 13.2 Statistical Techniques: Business innovation survey

### 13.2.1 Data cleaning

Online surveys were used, thus respondents entered data directly into a database, when answering the questions. Initial statistical checks were undertaken to ensure there were no irregularities in the data. For example, if a question only has 5 response options in terms of rating the importance of performance objectives, any response with a 6 or higher indicates an error, and the data are cleaned accordingly. Data cleaning involves identifying and removing errors from the data to improve the quality of the data prior to analysis. Data was first screened using descriptive statistics, maximum and minimum values and potential outliers. Where values do not conform to expected values, these are checked and corrected if possible, or recoded as missing data, if problematic. Respondents who have stopped their business operations, or where a single owner/manager indicated that they employ one million staff with no management accounts, were removed from the dataset.

### 13.2.2 Additional notes to definitions and variables

*Innovation categories*

The innovation categories were coded to reflect the approach used by CBR. This approach dealt with different interpretations of the question asking respondents to rate their innovation as either 'new-to-firm' or 'new-to-firm-and-industry'. One group chose both options if they had 'new to firm and industry' innovations, while the second group only chose the relevant option. Therefore, data was coded as follows:

Firms were asked to respond 'yes' or 'no' as to whether they had introduced any new innovations in any of the six innovation types during the last three years. These innovations could either be 'new to the firm' or 'new to the firm and industry'. Therefore, for each of the six different types of innovations above, respondents gave one of four possible combinations of answers to the following two questions:

- *Innovation new to your firm but not to your industry?*
- *Innovation new to your firm and to your industry?*

*The four combinations were:*

- *no/no – coded as 'no innovators' because they did not report any innovation;*
- *yes/no – coded as 'new-to-firm' innovators because their innovation, while new to their firms, were not new to the industry; and*
- *no/yes or yes/yes – coded as 'new-to-industry' innovators because their innovations were new to the industry.*

As a result, for each innovation type as defined above, firms were coded one of three possible mutually exclusive options: no-innovation, new-to-firm innovators, or new-to-industry

innovators. Note, however, that the innovation levels are not mutually exclusive as firms could have developed more than one type of innovation.

#### Innovator/innovation active

The ABS defines innovation as 'the introduction of any new or significantly improved goods or services, the introduction of new operational processes (the methods of producing or delivering goods or services) or the implementation of new organisational/managerial processes.' Firms were considered 'innovators' if they had introduced at least one of these types of innovation during the period reported.

#### Firm size

The firm size variable was constructed using information on the number of full-time equivalent (FTE) employees. This was calculated by combining the number of full-time staff and the number of part-time staff multiplied by an approximate 0.5 part-time workload. Using the number of FTE employees calculated, firms were divided into the following categories: 1-4 FTEs (micro firm); 5-19 FTEs (small firm); 20-199 FTE (medium-sized firm); and 200+ (large firm).

### 13.2.3 Quantitative data analysis

Data analysis techniques were chosen based on appropriateness to the data and violations of parametric data assumptions. Descriptive statistics such as mean, standard deviation and standard errors were presented where data are continuous. Where data are not continuous, frequency and count data are presented. The implications for interpretation of data based on the construction of the variables are discussed where appropriate throughout the results section in this document. The data was analysed using the SPSS statistical package[29] . Descriptive statistics and frequency analysis were used as well as chi-square and t-tests to determine differences between groups.

[29] Field, A., 2013. Discovering statistics using IBM SPSS statistics. 5th edition. Sage: London.

# 14. Appendix B: Ecosystem resilience assessment

## 14.1 Method

### 14.1.1 Survey sample and response rate

The survey was conducted from February to April 2021. Participants were selected as experts based on project partner and regional innovation coordinators lists of individuals responsible for one of the 12 identified roles in the region. Individuals on these lists were invited to participate through personalised email invitations. A total of 85 respondents commenced the survey, of which 74 per cent provided ratings to all indicators. Between 51 to 70 ratings were provided for each indicator and role combination. A notable bias was identified for rating of self-role versus rating of roles of others. As such, self-ratings were omitted from mean calculations. A total of 6,248 ratings were considered in the analysis, a number which excludes self-ratings, as shown in Table 6.

***Table 6:*** *Total ratings from 12 roles per community resilience indicator*

| | Corporate | Economic Development Organisation | Education Provider | Government | Incubator | Investor | Local SME | Peak body | Schools | Service provider | University |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Trust | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Collaboration Internal | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Collaboration External | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Connection Internal | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Connection External | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Diversity | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| COVID | 63 | 0 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Support | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |
| Advocacy | 63 | 70 | 67 | 51 | 65 | 69 | 64 | 66 | 66 | 54 | 67 |

### 14.1.2 Survey instrument

The survey instrument was developed from indicators of community resilience, expanding on the work of Sharifi[30] and Renando[31], and pre-tested among five management and entrepreneurship scholars. Survey items were developed for each indicator are outlined below:

- *Entrepreneur support:* How likely would you be to engage the roles below for direct support of local innovation-driven entrepreneurship for yourself or recommend others to engage this role?
- *Trust:* In your opinion, to what extent is it generally possible to trust the role listed below in relation to local innovation-driven entrepreneurship? Generally, trust refers to actors in roles doing what they say they will do, that there is an absence of the misuse of power for private benefit, and that their actions meet expectations.

[30] Sharifi, A., 2016. A critical review of selected tools for assessing community resilience. Ecological indicators, 69, pp.629-647.

[31] Renando, C. 2021. The role of the innovation hub in contributing to community resilience, Unpublished doctoral dissertation, University of Southern Queensland, Queensland, Australia.

- *Diversity:* To what extent do you feel the roles below actively and directly support diverse community groups, including Indigenous people, females and minorities, to engage in local innovation-driven entrepreneurship?
- *Advocate:* To what extent do you feel the roles below advocate for (raises awareness, promotes, generates support) local innovation-driven entrepreneurship?
- *COVID-19:* Consider the recent response to COVID-19 in the community in which you work. To what extent do you feel the roles below played a part in supporting local businesses to adapt?
- *Connection:* To what extent do you feel the roles below actively connect different groups *within/outside* the local community in relation to local innovation-driven entrepreneurship?
- *Collaboration:* To what extent do you feel the roles below actively facilitate collaboration (working together for a common cause) *within/outside* the local community in relation to local innovation-driven entrepreneurship?

In this study, respondents were asked to identify with one primary role. This was clarified to respondents as follows:

> *The term 'role' refers to the types of activities or functions you perform. You may perform multiple roles. Your role is also different to the organisation or your employer.*
>
> *Some examples to help clarify how to define your primary role:*
>
> - *You may be a service provider or consultant providing a service such as grant writing to government. Your primary role is as a service provider.*
> - *You may be a contractor engaged by a university to manage a coworking space. Your primary role would be a coworking space.*
> - *You may be business owner who is the CEO of the local Chamber of Commerce. Your primary role is Chamber of Commerce.*
> - *The intent to separate service providers is that they provide a fee-for-service that supports other local businesses to grow. This is distinct from other local SMEs that include manufacturing, provide retail, accommodation, etc.*
> - *You may have worked for multiple training organisations (TAFE, a training organisation), but your primary role will be education provider.*

The questionnaire took 18 to 20 minutes to complete. Responses were collected by USC and Startup Status and respondents were guaranteed anonymity and confidentiality (as per the ethics approval of this project: A181147).

### 14.1.3 Level of analysis

The level of analysis is at the innovation ecosystem role level. The analysis aims to provide an understanding of the strength of the innovation ecosystem in relation to a contribution towards community resilience.

### 14.1.4 Critical assumptions and limitations

*Assumed enabling and inhibiting contributions:* The research acknowledges that there is inherent value presumed in innovation ecosystem activity. This is an important assumption, in that there are many examples where innovation ecosystem activity results in detrimental outcomes for segments of a community or that development in some areas can have detrimental impacts on other aspects of the community. The research is developed out of an underlying question asking, "What are the enabling and inhibiting contributions of the innovation ecosystem?" The sum of these contributions provides insights into the relative strength of the innovation ecosystem and guidance for innovation ecosystem related strategies.

This component of the research is not without its limitations. One of the limitations of the research is related to the sample size of the experts (respondents in specific roles) in the region. The number of experts is partly due to the limited number of the roles in a region. A regional community may only have one chamber of commerce staffed by a part-time volunteer position or may not have anyone acting in a local investor role. However, the value of the multi-rater assessment is that the lack of function in a region is reflected in ratings of others in low-serviced roles.

The research is also limited in describing the underlying reasons for perceived ratings. As noted in the report, a high or low rating can be a result of the stage of maturity of the local innovation ecosystem, capability or capacity in a role, whether the role addresses the community resilience indicator as a legitimate function, and other contextual factors. In identifying perceptions of role contributions towards community resilience, the research supports conversations in community as to the underlying cause in the local community context.

The research also shares limitations inherent to 360-degree assessments in reflecting rater biases, a rater's understanding of the constructs, and raters' assumptions across regions[32]. The research acknowledges that the results reflect the perceived performance of each role, providing an indication of innovation ecosystem network strength. Some of these biases were addressed by excluding self-ratings, which was consistently higher than across all roles and against each indicator.

### 14.1.5 Data collection and analysis

Data was collected and initially stored using the Qualtrics survey platform. Ratings were averaged by role and community resilience indicator, excluding self-ratings. Results were colour-coded based on the average relative rating for each community resilience indicator, with high ratings coded as green, moderate ratings yellow, and low ratings red.

[32] Hannum, K. M. 2007. Measurement Equivalence of 360-Assessment Data: Are different raters rating the same constructs? *International Journal of Selection and Assessment*, *15*(3), pp. 293-301.

### 14.1.6 Open responses to enablers and inhibitors

Responses were coded following two rounds of thematic coding, open coding and axial coding[33]. Open coding is concerned with identifying and categorising phenomena. Axial coding relates codes to each other.

[33] Charmaz, K., 2008. Reconstructing grounded theory. In: P. Alasuutari, L. Bickman, and J. Brannen (Eds.), The SAGE handbook of social research methods, SAGE Publications Ltd. pp.461-478.

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